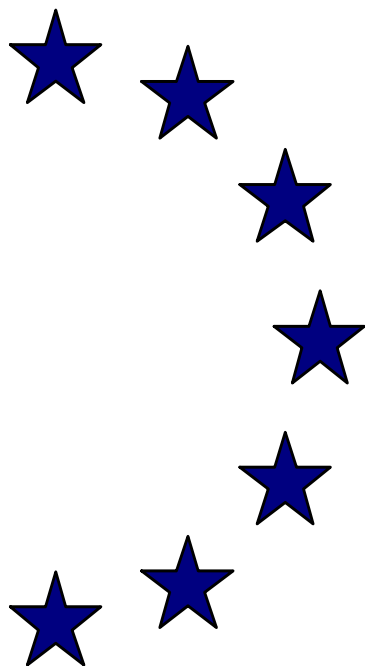


EUROPEAN ECONOMY

EUROPEAN COMMISSION

DIRECTORATE-GENERAL FOR ECONOMIC
AND FINANCIAL AFFAIRS

ECONOMIC PAPERS



ISSN 1725-3187

http://europa.eu.int/comm/economy_finance

N° 202

May 2004

Public investment and the EU fiscal framework

by

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Directorate-General for
Economic and Financial Affairs

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ECFIN/002726/04-EN

ISBN 92-894-5967-0

KC-AI-04-202-EN-C

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Public Investment and the EU Fiscal Framework

Alessandro Turrini

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April 2004

Abstract

It is often claimed that the introduction of the EU rules-based fiscal framework of the Maastricht Treaty and the Stability and Growth Pact was responsible for a decline in public investment shares in EU countries. Proposals have also been made in recent times in favour of a revision of the EU fiscal framework in such a way to grant special treatment to public capital expenditures (e.g., by amending it with a ‘golden rule’).

This paper analyses empirically the relation between the introduction of the EU fiscal framework and public investment. Results from panel data analysis suggest that the impact of the EU rules for fiscal discipline is not a clear-cut one. On the one hand, after phase II of EMU, public investment is found to be more negatively affected by debt levels. This is consistent with the view that in the run-up to Maastricht the budgetary adjustment implied a significant decline in public investment, especially in high-debt countries. On the other hand, results indicate that after phase II of EMU the negative relation between previous-period budget balances and public investment started being insignificant, meaning that the improvement in the budget balances consequent to the introduction of the EU fiscal rules may have helped to create room for public investment in several EU countries.

An illustration of the main trade-offs involved by amending the EU fiscal framework with a golden rule is also provided and the policy issues raised by the rising recourse to Public-Private-Partnerships (PPP) contracts to carry out public purpose investment projects are discussed.

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1. Introduction

There is a quite wide perception that the Maastricht convergence process led a fall in public investment expenditures in EU countries and that the requirements of budgetary discipline enshrined in the SGP may be act as a brake for investment expenditures in EU countries. Consistently with such perception, several calls have been made to amend the SGP in such a way to grant a more flexible treatment to capital expenditure when fixing budgetary targets and ceilings.

This paper analyses empirically the relation between the EU fiscal framework and public investment patterns in EU countries, reviews the main arguments in favour and against the golden rule put forward in the academic and policy debate, and discusses some of the issues for fiscal policy raised by the increasing use of Public-Private-Partnerships (PPP) contracts to carry out public purpose investment projects.

The decline in public investment shares on GDP is a long run tendency that goes back to the 70s and that characterises not only EU countries but also other developed economies. Among the factors that explain the long-run tendency towards falling government investment in industrialised countries there are factors related to structural change, a general tendency towards a shrinking government sector, but also the need to adjust public expenditure in the face of rising public debts (Oxley and Martin (1991)). Overall, in spite of a protracted reduction in government investment in most advanced economies and markedly in EU countries, existing analyses fail to provide a strong and general indication that public capital is in short supply. Most of the studies analyzing the contribution of public capital to production efficiency (e.g., Aschauer (1989)) or growth (e.g., Easterly and Rebelo (1993)) support the view that public investment gives a positive contribution to countries' productive potential. However, the estimated contribution of public capital is often small and the results from such analyses are fragile, depending quite heavily on the analytical methodologies employed.

Concerning the link between the introduction of the EU rules for budgetary discipline and public investment developments in EU countries, the evidence provided in this paper supports the view that during phases of budgetary consolidations, especially those carried out after mid '80s, public investment was reduced proportionally more than other expenditure categories in EU countries. However, the decline in government investment shares in the EU seems to have stopped after the introduction of the single currency and the SGP. Moreover, the data show that during the nineties developments in government investment in the countries that adopted the single currency did not differ much compared with those that did not.

To understand the impact of the EU fiscal framework on public investment one should isolate the contribution of other factors that also help to explain the observed developments in public investment. This is the aim of the empirical analysis provided in this paper. A reference theoretical model is first developed to isolate a limited number of determinants that may have explained the observed changes in government shares in EU countries and to account for a role played by the advent of the EU fiscal framework. The basic idea underlying the proposed model is that policy authorities base their decisions concerning government investment expenditures by trading-off efficiency objectives

(how much investment is needed to adapt the supply of infrastructures and other public-purpose capital assets to the needs of the economy) and budgetary objectives (which amount of investment expenditure is consistent with the target budget balance). In line with current practice (e.g., Melitz (2000), Von Hagen Hugues-Hallet and Strauch (2001), Ballabriga and Mongay (2002), Gali and Perotti (2003)), budgetary objectives are in turn modelled by means of a fiscal rule explaining the desired budget balances as a function of output gaps (capturing the output stabilisation objective of fiscal authorities), debt levels (capturing a debt stabilisation purpose) and past budget balances (capturing an element of inertia in budgetary decision making). In such a framework, the presence of the EU fiscal framework is assumed to impact on the parameters of the fiscal rule, i.e., the reaction of fiscal authorities to output gaps, debt levels and past budgets. The empirical test of the model in a panel including 14 EU countries for the 1970-2002 period supports the view that the introduction of the EU fiscal framework may have had effects on public investment via a modified behaviour of fiscal authorities in the determination of the budget balance. On the one hand, after phase II of EMU, the impact of debt on investment expenditure becomes more negative, and this is consistent with high-debt countries carrying out a strong adjustment in their public finances in the run-up to Maastricht which may have contributed to compress public investment expenditure. On the other hand, the improvement in the budget balances consequent to the introduction of the EU fiscal rules may have helped to create room for public investment in several EU countries. This is reflected in the fact that after phase II of EMU public investment is not anymore significantly negatively related to previous period budget balances (primary CABs). Overall, it is difficult to say whether public investment would have been higher or lower in the absence of the EU fiscal framework: the answer to such question is likely to be highly country-specific.

Concerning the debate on the golden rule, applying ceilings and targets to deficits net of capital expenditures would have help to spread over time and across generations the cost of projects yielding returns over the long-run. This might improve the inter-temporal allocation of resources, by allowing better consumption smoothing and would permit a more equitable repartition of costs and benefit of capital expenditures across generations (e.g., Balassone and Franco (2001), Buti, Eijffinger and Franco (2002), Buitier and Grafe (2002), Blanchard and Giavazzi (2004)). However, the adoption of the golden rule raises a number of issues which are likely to be particularly serious in a multilateral setting like that of the EU fiscal framework. If fiscal ceilings and targets are applied to public investment net of depreciation, the golden rule would raise implementation issues. Since data on capital depreciation is the outcome of complex estimation procedures, problems of reliability and timely availability of data on current budget balances would also arise. In the EU framework, because of differences across countries concerning consolidated practices and technical capacity for the estimation of capital depreciation, this problem can become quite relevant: the increased uncertainty on the 'true' value for the fiscal aggregates adopted in the EU rules-based fiscal framework may compromise the quality of multilateral budgetary surveillance. Such problem should be weighted against probably limited benefits. In fact, the introduction of the golden rule would probably not change significantly the actual values of budgetary ceilings and targets in the EMU fiscal framework. Values for net investment are indeed quite small compared with those of

budget deficits: in the past decade, net investment in the EU was always below 1 percentage point of GDP. If instead the golden rule in the EU framework is applied to gross investment, there is the risk that in some countries ‘tolerated’ deficits may become too high to guarantee the sustainability objectives of fiscal discipline of the EU fiscal framework.

A last point is raised on the growing practice of financing public purpose investment projects through public-private partnerships (PPPs). This practice for carrying out public purpose investment projects may have a sound microeconomic rationale (increased efficiency without compromising public objectives). However, since PPPs permit (under certain conditions concerning the way PPP contracts are designed) to carry out public investment projects without affecting current budget deficits, the risk is there that PPPs are chosen as an alternative to traditional public investment for the purpose to put capital spending outside budgets, even when there is no efficiency gain. This will normally translate into increased deficits in the future (related with the stream of regular payments from the government to the PPP operator) a possible increase in the riskiness of public budget outcomes and a possible reduction in the present value of future budget balances compared with the alternative of carrying out the same project through traditional public investment. An evaluation of the long term impact of PPPs on public finances requires transparency in the conditions underlying PPP contracts (e.g., the presence of government guarantees on the debt issued by PPP partners) and in the national accounting standards followed to record PPP projects.

The remainder of the paper is structured as follows. In the next section the definition of public investment used in national accounting is discussed and long-term trends in public investment shares in advanced economies are illustrated. Section 3 is devoted to a review of the theoretical arguments in favour of investment projects undertaken by the public sector and to a survey of the empirical findings concerning the effects and determinants of public investment. Section 4 analyses developments in government investment expenditures in EU countries, with a focus on the implications of the process of fiscal consolidation in the run up to Maastricht for public capital expenditure. Section 5 develops a theoretical framework for analysing the impact of the introduction of the EU fiscal framework on public investment and tests it empirically. The pros and cons of the ‘golden rule’ for investment are discussed in section 6, while section 7 addresses the issue of the implications of the increasing use of PPPs for EU public finances.

2. Definitions and broad trends

Through public investment, the public sector increases and improves the stock of capital employed in the production of the goods and services they provide. The construction of public infrastructure (streets, bridges, railways,...), the purchase of capital goods by public administrations (health care equipment in hospitals, office machines,...), the expenses to ameliorate the existing capital stock owned by the public sector are all examples of public investment.

In national account statistics, investment is defined as expenditures in fixed assets, e.g., in items that last for more than one year. The most widely used statistical definition of public investment is the gross fixed capital formation of the general government.¹ Fixed assets are not necessarily physical. Intangible assets, like patents or software enter in fact the definition of gross fixed capital formation. Moreover, some types of military expenditures such as the “purchase of military weapons and their supporting systems” are not included in the category of gross fixed capital formation, whereas all military expenditures with a possible civilian use (e.g., hospitals) are included.²

An important remark concerns the relation of the statistical definition of public investment with capital accumulation. The notion of public investment currently used in national account statistics includes the relevant transactions that lead to changes in the stock of physical capital, but exclude a large amount of expenditures related to the accumulation of human capital. While the construction of research laboratories or the purchase of computer software enters the definition of public investment, the wages paid to researchers and scientists are classified among current expenditures of the public sector, in spite of the fact that the labor services provided by these professional categories contribute to the accumulation of human capital.

A relevant distinction is also the one between gross and net investment by the public sector. Only the second definition takes into account depreciation, namely, the loss of economic value of the current capital stock due to usury or obsolescence. This is the correct definition to measure the actual increase in value of the stock of public capital. However, the available statistics on net investment are the result of estimation methods, and are thus of limited reliability. When analyzing public investment, it is therefore common to refer to the statistical aggregate ‘gross fixed capital formation of the general government’.

In most industrialized countries, (gross) public investment has been on average below 5 per cent of GDP in the past thirty years, a fraction about five times lower compared with that of private investment.³ Starting from the seventies, public investment has been falling in a number of OECD countries (Oxley and Martin (1991)). The picture is however quite differentiated depending on the country considered.

Figure 1 summarizes the evidence on the EU, US, and Japan.⁴ While public investment as a share of GDP did fall visibly in the US and in the EU during the seventies and the first half of the eighties, a similar patterns is not followed by Japan. At the beginning of the seventies, the share of public investment in Japan was of the same order of magnitude of

¹ In ESA95, the European system of accounts, gross fixed capital formation consists of “*resident producers’ acquisitions, less disposals, of fixed assets during a given period plus certain additions to the value of non-produced assets realised by the productive activity of producer or institutional units. Fixed assets are tangible or intangible assets produced as outputs from processes of production that are themselves used repeatedly, or continuously, in processes of production for more than one year*”.

² This is a major difference with respect to the accounting system used in EU countries prior to ESA95.

³ Source: AMECO Database.

⁴ A downward trend in public investment as a share of GDP is quite marked in non-EU OECD countries like Norway, Canada, Australia, Iceland and New Zealand. In Switzerland the share of public investment on GDP has remained instead quite stable. A main exception among OECD countries is South Korea, where the role of public investment has been on average growing.

that in the EU (around 4.3 per cent) and higher than in the US (3.2 per cent). After a rise and fall path ended in the early nineties, Japanese public investment is currently at a level almost double compared with that of the US and the EU (5.5 per cent against 2.9 for the US and 2.4 for the EU). It is also to note that both in the US and the EU public investment started rising again relative to GDP in the nineties. However, while public investment in the EU has been falling throughout almost all the whole eighties, in the US public investment was rising already since mid eighties. Due to this earlier recovery in public capital formation, at the end of the nineties the share of public investment in the US is higher than that in the EU, a situation opposite to that in previous decades.

There are several factors underlying the downward trend in public investment in advanced countries.⁵

There are first reasons linked to economic structural development. The supply of public capital (public infrastructure especially) depends upon the level of countries' development, being relatively higher at intermediate stages of development.

Second, there are reasons related to institutional changes occurred in the past decades. As a result of developments in financial instruments for hedging risk, the private sector have increasingly replaced the government in the realization of risky long-term projects. In a number of industrial and industrializing countries the eighties and nineties have also been characterized by privatization practices and operations leading to a reclassification of public-purpose capital assets. In some countries, privatizations led to a relevant reduction in the share of investment carried out by public corporations.⁶ Financial operations leading to sales of real assets by the government to the private sector or to public corporations resulted in a one-off reduction in government investment. Moreover, in several countries, it became quite common practice in recent years to undertake investments of public interest through the operation of public-private partnership agreements. Through this practice the public sector appoints private companies to realize the desired projects, whose finance may come from bonds issued by the appointed companies (and possibly backed by the state), future flows of user fees, or future flows of payments by the appointing administration. Frequently, public purpose investments carried out this way are not registered as public investment in national account statistics.

Finally, there are reasons related to the shrinking scope of the public sector and the management of public finances. Starting from the eighties, the academic community and policy makers in several countries shifted away from enthusiasm for activist government, as a result of disillusionment with respect to the effects of the performance of welfare state programs, together with an increasing awareness of the disincentive effects of heavy taxation. To a certain extent, reduced public investment programs in the eighties were the outcome of changing beliefs and orientations of policy makers. In the same period, a number of industrial countries were faced with rising public deficits and debts. In many

⁵ See, e.g., Roubini and Sachs (1989), Oxley and Martin (1991) and De Han, Sturm and Sikken (1996) for an analysis of the reasons explaining the broad tendencies in public investment across industrial countries.

⁶ For instance, after the privatisation of telecom and energy companies, and of airports and railways, about 15% of UK gross fixed capital formation was transferred from the public to the private sector (Pollitt, 2000). It is to note that in case of privatization what is affected is the amount of investment carried out by public corporations, which is not classified as government fixed capital formation.

instances governments found it politically easier to consolidate public finances by winding back public investment rather than cutting current expenditures.

3. Public investment : theory and empirical evidence

3.1. Normative and positive theories on public investment

There are several reasons that explain why the public sector should undertake investments.⁷

There is first the supply of public goods. The case of public investment has especially to do with intermediate public goods. A typical example is that of transport infrastructures such as harbours or railways. Infrastructures are capital goods that produce benefits simultaneously to a multiplicity of firms. Quite often, the investment activities carried out by the public sector translate into an increase in the value of the stock of these type of infrastructure.

A rationale for public investment can also come from the presence of various sources of market failures. Investment in the education sector can be justified on the ground of human capital externalities and knowledge spillovers. Due to such phenomena, the social marginal productivity of education would exceed the private one. In absence of public intervention, under-investment in schooling and education-related activities would arise.

A further justification for public intervention in the provision of infrastructures comes from the presence of increasing returns and natural monopoly-type arguments. The provision of network infrastructures (in transport, energy distribution or telecommunication for instance) is subject to increasing returns associated with so-called network externalities. The cost of extending network structures is negatively related to their size. This leads to the emergence of increasing returns and a natural tendency towards monopolization. In such industries, public intervention through the direct supply of services or the regulation of the sector is desirable to overcome the inefficiencies associated with the undersupply by the private sector.

An additional argument in favour of public investment is that of missing markets for capital or insurance that result from asymmetric information problems. In the absence of properly functioning capital and insurance markets, private firms may not be willing to undertake risky projects or projects that can be recovered only over a very long time horizon. In these cases, the only alternative to have such type of projects carried out is through the public sector. Missing insurance markets can also give a rationale to welfare state programs, for instance the public provision of health care services.

Finally, public investment may serve redistributive purposes rather than allocation purposes. This is the case for investment related to the provision of several types of welfare state services and, more in general, covers all those cases in which public intervention is aimed at redistributing income in favour of disadvantaged groups of citizens (e.g., regional policies...).

In principle, public investments are desirable until their social marginal productivity exceeds their social marginal cost. In practice, this condition is hardly met. The actual supply of public investment depends upon the specific institutional setting considered

⁷ For a general treatment of the rationale for public sector activity see, e. g., Atkinson and Stiglitz (1990).

(degree of fiscal federalism, voting procedures,...) and by the outcome of economic evaluations by policy makers (e.g., through cost-benefit analysis). Due to imperfect information, free-riding problems, institutional constraints and interest groups' strategic behaviour the actual supply of public investment may end up being either below or above the theoretical optimum.

Free-riding problems are a basic reason why public investment that plays the role of public goods may turn out to be in sub-optimal supply. Since public goods are by nature non-rival, agents do not have the incentive to fully reveal their valuation of such goods. If taxes or user charges are positively related to the individual revealed demands for public goods, each agent would try to understate their demand, with the view of free-riding on others' contributions.

Political economy considerations may explain possible over-investment by the public sector. A basic reason is that public investments such as infrastructures tend to concentrate the benefits among a clearly identifiable and relatively small subset of the population, while the costs tend to spread among a larger and more diffused group. Such types of "pork-barrel" projects may end up being over-provided by the public sector. Drazen (2000) reports several arguments in favour of this hypothesis.

In summary, in spite of the fact that there are numerous reasons that justify the desirability public investment, the actual behaviour of public authorities may diverge substantially from optimality principles. Public investment may thus be either in defect or in excess. Understanding whether a particular country or region lacks public investment or suffer from wasteful public projects is most often an empirical matter.

3.2. Public investment, productivity and growth : the empirical evidence

To assess whether public capital is under or over supplied in a given country or region there is a basic question to be answered: "how large are the benefits from public investment?". Large benefits would be likely to be associated with insufficient public capital provision, small benefits with possible over supply.

In the nineties a large amount of research has been carried out with the aim of measuring the contribution of public capital in terms of increased production possibilities, reduced costs for the private sector or enhanced growth prospects. In spite of the different approaches and methodologies followed, in all these analyses the implicit assumption is made that the role of public capital is that of a production factor of particular type. Different measures of public capital have been employed (total public investment from national account statistics, estimates of the net public capital stock, estimates of the stock of public infrastructures, estimates of transport infrastructure only,...). Overall, most of the existing studies indicate that public capital has a positive impact on output and productivity, but results appear to be fragile and there are cases in which the impact is insignificant or even negative.

A first strand of studies follow the so-called "production function approach". The aim is that of estimating the parameters of an aggregate production function in which public

capital enters as a separate productive factor. The obtained estimate of the marginal productivity of public capital is thus chosen as a measure for the benefits of public investment. This approach has been followed for the first time in Aschauer (1989a) who found that, for the US case, public investment would exert a strong positive impact on production: a 1 percentage point increase in the public capital stock would raise aggregate output by almost 0.4 percentage points. This result generated a vivid debate among academic and policy circles and a series of works in the line of that by Aschauer (1989a) followed. In these subsequent analyses different datasets have been used and alternative methodologies have been tested. While results do not seem to depend crucially upon the particular country considered (a significant and positive impact of public capital on output has been found in countries other than the US, see, e.g., Aschauer (1989b), Merriman (1990), Ford and Poret (1991)) the level of aggregation of the dataset and the way dynamic relations among the variables are modelled seem to matter.

Various authors employed panel data sets disaggregated at the state or regional level to account for the heterogeneity of the economic structure of different geographical contexts (e.g., Merriman (1990), Evans and Karras (1994), Baltagi and Pinnoi (1995)). In general, these analyses using more disaggregated datasets yield weak or insignificant results. Concerning dynamics, in most of the time-series analyses using the production function approach, no proper account is given of the possible non-stationarity of the variables, with the possible consequence of estimating spurious relations between public capital and output. Sturm and De Haan (1995), repeating the original estimation by Aschauer (1989b) using variables in first differences to obtain stationarity obtain insignificant results.

In other studies a different approach has been followed. Instead of estimating production functions, it has been followed the route of estimating the cost or the profit function of private sector firms (e.g., Berndt and Hansson (1991), Conrad and Seitz (1992), Lynde and Richmond (1993), Morrison and Schwartz (1996)). The idea is that public capital affects the costs and profits of firms as an unpaid fixed input.⁸ This approach has the advantage of imposing less restrictions on the equations to be estimated and allowing for the estimation of the shadow price of public capital.⁹ The results arising from the analysis that follow this approach are also quite ambiguous. In most of the cases public capital is found to reduce the costs of private sector firms. However, in some studies (e.g., Berndt and Hansson (1991) in the case of Sweden, Conrad and Seitz (1992) in the case of Germany) it has been estimated that public capital is in excess supply, since its social marginal productivity (proxied by its shadow price) exceeds its social marginal cost.¹⁰

Some analyses followed an a-theoretical approach. Instead of deriving measures of the contribution of public capital from the estimation of production or cost function equations, these studies investigate the dynamic relationship between public investment and other aggregate variables (output, private investment,...) through Vector Auto

⁸ Obviously, public capital is paid via the tax system, but these payments are not directly related to the use of public capital services.

⁹ The shadow price of public capital so obtained measures the impact on firms' costs of a unitary increase in public capital. This measure is thus an adequate proxy of the social marginal productivity of public capital, under the assumption that the main role of public capital is that of public input. Estimates of public capital shadow prices are commonly used in cost-benefit analysis and project evaluation.

¹⁰ Measures for the social cost of public capital are based on estimates of the public investment deflator, rates of return and depreciation rates.

Regressions (VAR) analysis (e.g., Clarida (1993), Otto and Voss (1996) Sturm et al. (1999)). Under this approach, no a-priori assumptions are made concerning causal relations: all variables are jointly determined. Granger causality tests address the question of the direction of causality starting from the data. In most of this work public investment measures are found to Granger-cause output but there are exceptions. Otto and Voss (1996), for instance find that in the Australian case public investment does not impact significantly aggregate output.

A different strand of studies analyses the impact of public capital on the growth potential of countries or regions (e.g., Barro (1991), Easterly and Rebelo (1993), Holtz-Eakin and Schwartz (1995)). The idea is that public capital (transport or communication infrastructure, for instance) has an impact on the accumulation possibilities of the economy, rather than on the level of output. The empirical methodology to test this hypothesis is that of cross-section growth regressions. Growth rates in per-capita income over a given time period for a collection of countries or regions are regressed on initial conditions and a list of conditional variables (e.g., measures of human capital stock), including the stock of public capital. Results from these studies appear to be very fragile. Depending on the set of countries and regions considered the impact of public capital may or may not be significant. A result to be remarked is that found in Easterly and Rebelo (1991). In a cross section of 100 countries total public investment does not significantly contribute to growth, while investments in transport and communication have a positive effect.

Overall, a majority of studies indicate that public capital has a positive impact on output, productivity, or growth. However, results appear fragile and the impact of estimated impact of public capital on efficiency is often quite weak. The weak estimated impact of public capital on output can be explained by the fact that the purpose of a relevant share of public investment expenditures is not that of (static or dynamic) efficiency but rather that of affecting the distribution of income, either for equity reasons or to better satisfy political ‘clienteles’ and interest groups.

3.3. The determinants of public investment: empirical analysis

A relatively small amount of studies have also been conducted with the aim of investigating which factors mostly affect the evolution of public investment over time or its distribution across countries. Most studies analyse the case of given countries along the time dimension (e.g., Aubin et al. (1988) for France, Herenkson (1988), Kirchgassner and Pommerehne (1988) for Germany and Switzerland, Sorensen (1988) for Norway), but there also studies considering simultaneously several countries in panel data sets (e.g., De Haan, Sturm, and Sikken (1996) for 22 OECD countries).

All the above studies use as dependent variable measures of total public investment obtained from national account statistics, treated alternatively in real levels, as a share of current GDP or as growth rates.

The explanatory variables that have been used in the above studies can be grouped into two different categories. The first category are macroeconomic variables. The purpose of some of these variables is that of capturing the effect of cyclical factors on spending on

public investment. The idea is that since governments may pursue stabilisation objectives, other things being equal, public investment is likely to be higher in cyclical downturns. Cyclical factors are represented alternatively by the rate of inflation, the rate of unemployment or the growth rate of real GDP. The real per capita GDP variable is instead included to account for structural transformations in the economy. Variables to take into account the cost of public investment have also been considered. Among those, measures of the relative price of investment and the level or long term real interest rates have been considered. The purpose of other economic variables is that of controlling for the state of public finances. The justification for the inclusion of a debt variable is that higher debt is associated with higher interest payments and then with a smaller scope for investment expenses. The rationale for the inclusion of deficit variables is that higher levels of deficit tend to be associated with a higher probability of fiscal consolidation and with a (possibly more than proportional) cut in public investment (Oxley and Martin (1991), Roubini and Sachs (1989)).

The second set of variables are politico-institutional variables.¹¹ Measures of public employment have been included to have a proxy of the role played by bureaucracies and interest groups in supporting public investment programs. The degree of fiscal federalism (proxied, for instance, by the share of taxes collected by the central government) is expected to affect the bias towards excess public spending, with more decentralized governments associated with a smaller size of the public sector and possibly with lower public investment. Dummies capturing the ideology of parties holding the majorities in Parliaments have been used to assess whether public investment is systematically related with the ‘colour’ of the parties holding power. Finally, several measures of ‘government strength’ (size of coalition in power, number of governments’ turnover) to test whether ‘weak’ governments are characterised by a shorter time horizon and then a lower propensity towards fixed (public investment) rather current expenditure.

Results from these analyses are generally quite fragile. The sign of the coefficients is generally the one expected a-priori, but it is quite often not significantly different from zero. Among the macroeconomic variables, measures of the conditions of public finances tend to perform quite well (e. g., Aubin et al. (1988), Herenkson (1988), Sturm et al. (1996)). Concerning politico-institutional variables, public employment variables are found to affect positively public investment (Herenkson (1988), Sturm et al. (1996)), while the degree of centralization of tax collection and government turnover have a negative impact.

4. Public investment in the EU

As remarked in section 2, the EU area during the past decades has been characterized by shares of public investment comparable with those of the other major economic areas like the US and Japan and by a more marked downward trend in this share. This aggregate evidence masks relevant cross-country differences. The aim of this section is that of analysing the developments in European public investment at the country level, with a

¹¹ Some studies (e. g., Herenkson (1988)) also include structural variables, like the rate of urbanisation or the demographic structure of the population.

focus on the relationship between the evolution in public investment and the management of public finances in EMU.

4.1. The evolution of public and private investment in EU countries.

On average, gross public investment in the EU in the 1970-2002 period has been slightly above 3 per cent of GDP. The majority of public investment outlays in the EU enter four categories.¹² The most important category is transport infrastructure (roads and bridges in particular), which accounts by itself for almost one third of the gross fixed capital formation of the general government. A share between 10 and 15 per cent of public investment is absorbed by fixed expenditures for education and health (e.g., construction and maintenance of school buildings and hospitals), while the provision of public housing and community amenities (e.g., water and sewers) accounts for roughly 10 per cent of public investment. The remaining share is mainly devoted to general public services (e.g., administration), defence and security. In European countries more than half of public investment is undertaken by local administrations (this is especially the case of transport infrastructure, housing, waters and sewers), even if the central government appears to play a major role in financing investment initiatives at the sub-central level (OECD (1998)).

For the EU-15 area, private investment averaged about 19 per cent of GDP. The difference between public and private investment is less marked when using net fixed capital formation figures instead. The ratio of net public investment on GDP is about 1.4, while that for net private investment is just above 6 per cent. This smaller difference can be related with the fact that on average the stock of private capital is higher than the stock of public.

Figure 2 reports the average gross public, private and total investment-GDP ratios separately for each country. Cross-country differences are quite remarkable both for public and private investment data. The lowest shares of public investment are recorded for the UK (2.6 per cent), followed by Germany and Italy. The highest ratios are those of Luxemburg (4.8), Sweden, Ireland, Austria and Portugal. Turning to private investment ratios, the lowest values are found in the UK (15.7) and Sweden, while the highest are observed in Portugal (23.2), Greece, Finland, Austria and Spain.

Evidence concerning net investment is reported in Figure 3. Net investment shares are generally less than one half of gross investment shares. In Denmark average net public investment during the 1974-2001 period has been particularly low, being slightly negative. Relatively low values are also observed in the Netherlands. At the opposite, in Ireland, Spain and Portugal net public investment has been relatively high in comparison with gross figures. A similar cross-country pattern is found for private investment: relatively low values are observed in Denmark and Finland, while Ireland, Spain and Portugal register relatively high values. These differences across countries between gross and net investment figures reflects primarily differences in the size and composition of

¹² Source : Matha et al. (2000).

the capital stock but may also be related to non uniform accounting practices for imputing depreciation.

Figure 4 reports average annual changes in the share of gross private, public and total gross fixed capital formation during the period 1970-2002. For the EU-15 aggregate it is observed a reduction in both the public and private component of investment, resulting in a reduction of the total investment share of half a percentage point per year. The average annual reduction is stronger for the public component, which is above 1.6 percentage points per year. This aggregate evidence does not take into account relevant country-level differences. In some countries (Greece, Portugal, Spain, Ireland, Luxemburg) the share of public investment has been on average rising over the period. Conversely, in other countries (Sweden, Austria, Belgium, Denmark, Germany, UK) the reduction in the public investment ratios has been particularly strong. This reduction in the investment activity of the public sector is partly the result of privatisation initiatives especially in the UK, Austria and Germany. The shift of ownership concerned mainly energy and telecommunication infrastructure. As a result of privatisation, public investment in these countries became even more concentrated into fewer sectors, such as transport infrastructure, health and education (OECD (1998)).

Quite notable cross-country differences emerge also when looking at changes in private investment shares. In Luxemburg, Ireland, Austria, Portugal and the UK the share of private investment has increased, while strong reductions are observed in France, the Netherlands, Finland and Italy. Total investment has grown in Portugal and Luxemburg, while in the remaining countries there is a reduction. This is relatively small in Spain, Austria and Ireland, relatively high in Sweden, the Netherlands and Germany.

Overall, the evidence shows that public investment has been growing in countries with relatively low per-capita income (Greece, Spain, Portugal, Ireland), while major reductions have occurred in some countries with relatively high per capita income and a tradition of welfare state and public intervention (Sweden, Austria, Germany, Belgium). Figure 5 plots percentage changes in government investment shares in the 1970-2002 period against income per-capita across EU countries.

4.2. Public finance management in the EU and public investment

Starting from the mid-seventies, European countries have been cumulating public debt, resulting from budget deficits caused by increased expenditure not matched by a proportionate rise in tax revenues. The growth in public debt has been accompanied by a consequent increase in interest expenditure. In EU countries public investment and interest expenditure followed quite opposite tendencies during the past decades. The fall in the share of public investment share on GDP started in correspondence with the raise in the share of interest expenditures (mid seventies). At mid nineties the share of interest expenditure started declining, while the decline in public investment stopped. These dynamics are partly explained by the fact that interest payments and public investment tend to be substitute. Interests on cumulated debt worsen the structural deficit of general government, requiring cuts in other expenditure components or tax increases to improve

budgetary positions. As pointed out in existing literature (e.g., Oxley and Martin (1991)), in periods of financial distress public investment are more likely to be cut than current public expenditure. While the latter is constituted to a large extent by wages and salaries (so that cutting current expenditure may be politically costly since this would mean cutting public employment) the former is made of fixed expenditures which can be delayed or moved to future periods with a relatively low political damage.

Table 1 presents evidence consistent with this hypothesis. It reports the average annual change in government revenues, total expenditures and public investment for the EU-14 aggregate separately during consolidations occurred in the 1970-2002 period and in those after 1985. Looking at the overall period, both expenditures and revenues increased, but revenues rose more than expenditures. Limiting the analysis to years following 1985 expenditures appear to fall and revenues to increase (but less compared with the overall period). Public investment falls during consolidations occurred throughout the whole period, and falls more strongly in consolidations that took place after 1985, which were concentrated on the expenditure side.¹³ Hence, there are indications that the budget adjustments preceding monetary unification that took place in most European countries at late eighties and in the nineties coincided quite often with public investment falling at rates above normal.

Graph 6 reports the average annual change in public investment shares in each EU country and in the EU aggregate during the nineties, distinguishing several sub-periods. The first sub-period chosen (1991-1993) coincides with phase I of EMU. In those years, public investment ratios fell on average by almost 3.5 per cent per year in the EU area. The reductions were concentrated in Italy (facing high and mounting interest payment on the stock of accumulated debt), the UK (coping with large deficits associated with the economic slowdown) and Finland (hit by a deep recession which turned into fiscal imbalances). The second sub-period (1994-1998) corresponds to phase II of EMU. It is in those years that the Maastricht calendar for monetary unification exercised the strongest pressure on governments, urged to keep their budget deficits below 3 per cent of GDP as a condition for entering EMU. Between 1994 and 1998 public investment registered the largest drop in the EU area (the ratio on GDP fell by almost 4 per cent per year). Reductions occurred in all EU countries, with the exception of Ireland, Greece and Finland. Interestingly, public investment fell also in all the countries that chose not to join EMU. While in Denmark and Sweden this reduction was not particularly strong, the UK is the European country registering the largest drop in public investment in this period.¹⁴ The third sub-period (1999-2002) coincides with the years of operation of euro. In spite of the fact that in this period the Maastricht requirements for fiscal discipline continued to operate (integrated with the provisions contained in the Stability and Growth Pact) the share of public investment on GDP rose on average in the EU area (by more than 2 per cent per year), inverting the downward trend started in the seventies. The increase is concentrated in Ireland, the UK, Greece and the Netherlands.

¹³ See, e.g., Buti and Sapir (), European Commission (2000), or Von Hagen, Hugues-Hallet and Strauch (2000) for an analysis of the characteristics of the consolidation process undertaken by Eu countries in the run-up to Maastricht.

¹⁴ The reduction of UK public investment in this period concerned mostly central government investment in health, education and defence (Clarke, Elsby and Love (2001)).

5. Which impact has the EU fiscal framework on public investment?

The evidence reported in the previous sections conveys several messages concerning developments in public investment in European countries. Public investment in Europe has been cut especially during the periods of fiscal consolidation occurring in the late 80s and in the 90s. The years preceding the introduction of the euro coincided with a particularly strong reduction in public investment ratios in most countries, including those that chose not to join EMU. Conversely, after the introduction of the euro, public investment ratios rose in the EU area for the first time after several decades of prolonged reduction.

Which was the role of EMU in shaping these developments? Prima-facie evidence seems to suggest that the effects of the fiscal discipline provisions of EMU were quite different before and after the introduction of the euro and that the countries choosing not to join the euro were not affected much differently compared with those entering the euro area. However, in order to understand properly the effects of the budgetary provisions of EMU one should isolate the contribution of other factors that help to explain the observed developments in public investment.

This section is aimed at analysing which impact the introduction of the EU fiscal framework had in explaining developments in government investment shares across EU countries in the years following phase II of EMU. Our analysis proceeds as follows.

In the next section a reference theoretical model is proposed to isolate the major determinants that may have explained the observed changes in government shares in EU countries and the role played by the advent of the EU fiscal framework. The basic idea underlying the proposed model is that policy authorities base their decisions concerning government investment expenditures by trading-off efficiency objectives (how much investment is needed to adapt the supply of infrastructures and other public-purpose capital assets to the needs of the economy) and budgetary objectives (which amount of investment expenditure is consistent with the target budget balance). In line with current practice (e.g., Melitz (2000), Von Hagen Hugues-Hallet and Strauch (2001), Ballabriga and Mongay (2002), Gali and Perotti (2003)), budgetary objectives are in turn modelled by means of a fiscal rule explaining the desired budget balances as a function of output gaps (capturing the output stabilisation objective of fiscal authorities), debt levels (capturing a debt stabilisation purpose) and past budget balances (capturing an element of inertia in budgetary decision making). In such a framework, the presence of the EU fiscal framework is assumed to potentially modify the parameters of the fiscal rule, i.e., the reaction of fiscal authorities to output gaps, debt levels and past budgets.

The following step in our analysis, carried out in section 4.3.2, is that of estimating empirically, in a country-year panel, the relation between government investment shares and the explanatory factors identified by means of the theoretical model and to assess. The final step is that of assessing numerically which government investment shares would have prevailed in EU countries in absence of the EU fiscal framework. To that purpose, counterfactual government investment figures are produced using predictions

from equations estimated country by country using data prior the introduction of the EU fiscal framework.

5.1 A reference model for public investment determination

This section develops a theoretical model for the determination of public investment. This model serves the purpose of isolating a number of explanatory factors and determining a framework for the empirical assessment of the impact of the EU fiscal framework on public investment developments.

The government makes budgetary decisions for time t at time $t-1$. The process is in two-stages. In the first stage, at time $t-1$ decisions concerning the overall value of the budget balance for time t are taken, given the value of the debt at time $t-1$ and the expectation on the output gap for time t . In the second stage, primary expenditure, both public investment and current expenditures is chosen.¹⁵

For simplicity, a “small country” assumption will be used, so that countries are assumed to be interest rate takers. This implies that governments do not take into account the impact of their own decisions on the level of interest rates.

As far as the first stage is concerned, the government decision is on the primary balance, i.e., government choices do not concern directly interest expenditures, which are outside their control. Moreover, the assumption is made that governments anticipate the impact that the cycle will have on revenues and then on the budget balance. Hence, the variable assumed to be chosen by the government is the cyclically adjusted primary balance (primary CAB).¹⁶

Following much of the existing literature, the primary CAB is assumed to be chosen with the view of striking a balance between the objectives of output and debt stabilisation. The government is assumed to solve this trade off by minimising a loss function that depends upon the square of the output gap and the square of the difference between the one year ahead forecast debt and a debt target. Moreover, the government is assumed to have a preference against large and sudden changes in budget balances. This ‘preference for the status-quo’ is captured by adding a further term in the loss function, which depends upon the square of the difference between the current and the one year ahead primary CAB.¹⁷

In the following, we will denote by d_t and \tilde{d}_t , respectively the primary *deficit* and the cyclically adjusted primary budget deficit at time t . The output gap is denoted by y_t , while B_t denotes the debt. All variables (except interest rates) are expressed in terms of potential output.

¹⁵ Note that since strategic interaction is absent, the sequence of stages is immaterial for results. Note also that public revenues are determined in the model once primary budget balances and expenditure categories are determined.

¹⁶ For simplicity, it is assumed that the only government revenues react automatically to the cycle. Results would hold qualitatively unchanged by allowing expenditures (mainly, unemployment subsidies) to react as well. Available estimates suggest in fact that the elasticity of expenditures with respect to the output gap is considerably smaller than the elasticity of revenues (e.g., Van den Noord (2002)).

¹⁷ See, e.g., Drazen (2000) for alternative explanations for a ‘status-quo bias’ in government objectives.

The first stage problem of the government at time $t-1$ is as follows

$$\min_{\tilde{d}_t} = \alpha(E_{t-1}y_t)^2 + \beta(E_{t-1}B_t - \bar{B})^2 + \gamma(\tilde{d}_t - \tilde{d}_{t-1})^2, \quad (1)$$

where E_{t-1} denotes expectations taken at time $t-1$ and \bar{B} is the target debt level. The assumption is made that the government does not make systematic forecast errors, so that $E_{t-1}y_t = y_t + \varepsilon_t^y$ and ε_t^y is a white noise disturbance. The output gap at time t is assumed to depend on the primary deficit and on a component that is independent of the deficit, \bar{y}_t , so that

$$y_t = d_t + \bar{y}_t. \quad (2)$$

After substituting the expression for the expected output gap and that of the debt in the government loss function, the government problem rewrites as

$$\min_{\tilde{d}_t} = \alpha(y_t + \varepsilon_t^y)^2 + \beta(E_{t-1}d_t + (1 + r_{t-1})B_{t-1} - \bar{B})^2 + \gamma(\tilde{d}_t - \tilde{d}_{t-1})^2. \quad (3)$$

For the sake of simplicity, and without loss of generality, it is assumed that revenues are the only cyclical component of the budget. Adopting a linear dependence of revenues on output, the expression for the cyclically-adjusted revenues, $\tilde{\tau}_t$, is as follows: $\tilde{\tau}_t = \tau_t - \eta y_t$, where τ_t are revenues and η is the ‘sensitivity’ of revenues to the output gap. From such assumption follows that the expression for the output gap can be written as

$$\tilde{d}_t = d_t + \eta y_t = e_t^c + I_t - \tilde{\tau}_t, \quad (4)$$

where e_t^c is primary expenditure and I_t is public investment. Using (2) and (4), it is easily shown that the output gap depends upon the cyclically-adjusted primary budget deficit and the independent component \bar{y}_t in the following way,

$$y_t = \frac{\tilde{d}_t + \bar{y}_t}{1 + \eta}. \quad (5)$$

Substituting (5) into (1) it is obtained that the problem of the government in setting its deficits target amounts to

$$\min_{\tilde{d}_t} = \alpha\left(\frac{\tilde{d}_t + \bar{y}_t}{1 + \eta} + \varepsilon_t^y\right)^2 + \beta\left(\frac{\tilde{d}_t - \eta\bar{y}_t}{1 + \eta} - \eta\varepsilon_t^y + (1 + r_{t-1})B_{t-1} - \bar{B}\right)^2 + \gamma(\tilde{d}_t - \tilde{d}_{t-1})^2. \quad (6)$$

Expressing the solution to the above problem in terms of cyclically adjusted primary budget balance (CAPB, denoted by \tilde{s}_t , $\tilde{s}_t \equiv -\tilde{d}_t$), we obtain

$$\hat{s}_t = \frac{\alpha - \beta}{\alpha + \beta + \gamma(1 + \eta)} \bar{y}_t + \frac{\beta(1 + \eta)}{\alpha + \beta + \gamma(1 + \eta)} ((1 + r_{t-1})B_{t-1} - \bar{B}) + \frac{\gamma}{\alpha + \beta + \gamma(1 + \eta)} \tilde{s}_{t-1} + \frac{\alpha - \eta\beta}{\alpha + \beta + \gamma(1 + \eta)} \varepsilon_y^y \quad (7)$$

The CAPB resulting from the solution of the first stage maximisation problem of the government depends linearly upon the component of the output gap uncorrelated with the budget balance, on the deviation of debt from target, on the past CAPB and on a white noise forecast error.

Note that the weight given to each of the explanatory factors depends upon the weights in the loss function of the government. The higher (say) the weight given to debt in the government loss function, the stronger will be the dependence on the chosen level of primary CAB on the debt level and the weaker the dependence on other explanatory factors. The impact of the debt level is positive, as it is positive the impact of past primary CAB values. As for the impact of the output gap, the sign depends upon the relative magnitude of parameters α and β . A sufficiently high value for α guarantees primary CABs that display a counter-cyclical pattern, as a result of output stabilisation objectives of fiscal authorities. However, as the value of parameter β increases, the debt-stabilization motive works against the output-stabilization motive, thereby inducing a less counter-cyclical behaviour of fiscal policy. Such different cyclical behaviour of the budget is rationalized on the following grounds: higher expected output gaps entail a higher cyclical component of the budget, which reduces the value of debt. Such reduced value of debt justifies running lower budget surpluses.

Turning to the stage in which the amount and composition of expenditure is chosen, it is assumed that this is again the outcome of a minimization of a cost function by the government. Concerning current expenditure, the objective of the government is that of minimizing a weighted average of the distance of the investment level from an efficiency-maximising level (denoted by I_t^*), and the distance between actual expenditure and the expenditure level that would prevail under a primary CAB level consistent with (7), denoted by \hat{e}_t .

Formally, the problem of the government is as follows

$$\min_{I_t} = \delta(I_t - I_t^*)^2 + \lambda(e_t - \hat{e}_t)^2 \quad (8)$$

whose solution is given by

$$I_t = \frac{\delta}{\delta + \lambda_t} I_t^* + \frac{\lambda}{\delta + \lambda} (\tilde{\tau}_t - \hat{s}_t - e_t^c) \quad (9)$$

In the above expression it has been used the fact that \hat{e}_t is given by the difference between cyclically adjusted revenues and the primary CAB that results from (7) and that primary expenditure is the sum of public investment and current expenditure e_t^c .

In the case of current primary expenditure, the loss is assumed to depend upon an inertia component, which increases with the distance between current and past expenditure, and again a component depending on the distance between actual and targeted expenditure \hat{e}_t . In formal terms, the problem of the government is

$$\min_{e_t^c} = \mu(e_t^c - e_{t-1}^c)^2 + \pi(e_t - \hat{e}_t)^2 \quad (10)$$

which yields solution

$$e_t^c = \frac{\mu}{\mu + \pi} e_{t-1}^c + \frac{\pi}{\mu + \pi} (\tilde{\tau}_t - \hat{s}_t - I_t) \quad (11)$$

The logic beyond the chosen specification of the objective functions is an often cited asymmetry between capital and current expenditures. While current expenditures are characterized by an element of inertia (mainly associated with long-term explicit or implicit obligations by the government, e.g., with public employees), this is not the case for public investment, since the political cost of opening, post-poning or canceling public investment projects is lower than that of cutting public employment or public transfers (e.g., Roubini and Sachs (1989), Alesina and Perotti (1995)).

Substituting the value of target expenditure \hat{s}_t from (7) and that for current expenditure from (11) into the expression for public investment (9), the following expression for public investment at time t is obtained

$$I_t = \frac{\lambda(\mu + \pi)\beta(1 + \eta)\bar{B}}{(\delta(\mu + \pi) + \lambda\mu)(\alpha + \beta + \gamma(1 + \eta))} + \frac{\delta(\mu + \pi)}{\delta(\mu + \pi) + \lambda\mu} I_t^* + \frac{\lambda(\mu + \pi)}{\delta(\mu + \pi) + \lambda\mu} \left(\tilde{\tau}_t - e_{t-1}^c - \frac{\alpha - \beta}{\alpha + \beta + \gamma(1 + \eta)} \bar{y}_t - \frac{\beta(1 + \eta)(1 + r_{t-1})}{\alpha + \beta + \gamma(1 + \eta)} B_{t-1} - \frac{\gamma}{\alpha + \beta + \gamma(1 + \eta)} \tilde{s}_{t-1} \right) + \varepsilon \quad (12)$$

where ε_t is a white-noise error term.

Equation (12) shows that, controlling for (cyclically-adjusted) revenues and lagged current expenditure, investment levels are expected to be negatively related with debt levels and past values of the primary CAB. A negative relation with debt comes from the debt-stabilizing objective followed by fiscal authorities when setting budget balances. The negative impact of past values of the primary CAB are the result of the inertia that characterizes government action: high past values of the primary CAB tend to be related to high current values for the same variable, with the consequence of reducing, ceteris paribus, the resources that can be devoted to public investment. As for the impact of the output gap, a negative impact is expected whenever the output-stabilisation objective prevails over the debt-stabilisation objective in policy-makers' preferences.

What about the introduction of the EU fiscal rules in such an analytical framework? We choose to model the presence of fiscal rules as an increase in the parameter β , i.e., a

change in the priorities of fiscal authorities, who would put a higher weight on the debt stabilization objective when choosing the primary CAB. Such an assumption is consistent with existing empirical work estimating fiscal rules followed by European fiscal authorities which shows that in the 90s the conduct of budgetary policy in EU countries became more oriented towards fiscal discipline objectives (e.g., Von Hagen, Hugues-Hallet and Strauch (2001)).

Such a change in government priorities affects primary CABs directly (eq. 7) and public investment indirectly. Equation (12) shows that as a result of change in the value of parameter β , the coefficient associated with B_{t-1} is expected to increase, making investment more dependent on debt levels. Note that for the same reason we should also expected an increase in the constant term, which captures the impact of the target debt level \bar{B} : a higher level of the target debt reduces the desired primary CAB (and increases investment), the more so the higher the weight β put by governments on debt stabilisation. Moreover, provided that in absence of fiscal rules the output-stabilisation motive prevails over the debt-stabilisation one (i.e., $\alpha > \beta$), the dependence of investment on the output gap is expected to be reduced by an increase in β . Finally, a reduction in the degree of dependence of investment on previous values for the primary CAB is expected, due to reduced inertia in setting budget balances.

Overall, the impact of fiscal rules on investment patterns is an ambiguous one at *given* values for investment determinants. On the one hand, a higher weight on the debt motive would squeeze deficits and reduce investment in high-debt countries. On the other hand, a lower dependency of investment on past values of the primary CAB may lead to increased investment expenditures, especially in countries characterized by high and positive primary CABs.¹⁸ It is also to note that the above reasoning is made keeping constant the value for the determinants of public investment.¹⁹ Allowing variables like deficits and debt to adjust to the EU fiscal framework introduces additional elements of ambiguity.

5.2. Empirical implementation

We verify empirically the model of determination of public investment illustrated in the previous section in a panel of 14 EU countries for the period 1970-2002. The source of the data is the ECFIN AMECO database. The basic equation that is estimated is as follows

$$I_{it} = a_0 + a_i + b_1 pcY_{it-1}^* + b_2 \tilde{\tau}_{it} + b_3 e_{it-1}^c + b_4 \bar{y}_{it} + b_5 (1 + r_{t-1}) B_{it-1} + b_6 \tilde{s}_{it-1} + \varepsilon_{it} \quad (A)$$

¹⁸ More generally, the ambiguous impact of a change in parameter β on investment levels comes from the ambiguous effect of β on the primary CAB, which can be understood from equation (7).

¹⁹ Namely, it is not taken into account the fact that, over time, a change in government priorities as reflected by an increase in β , will lead to different values for explanatory variables of public investment such as primary CABS and debt levels.

The dependent variable is gross fixed capital formation of the government sector, as a share of potential output. Variable pcY_{it-1}^* is the (lagged) per-capita output and it is used as a proxy for the efficiency-maximising investment level I^* . The lower the per-capita income, the higher the marginal productivity of public capital, and therefore the higher I_t^* (so that the expected sign for b_1 is negative). All the remaining explanatory variables have the same meaning as explained in the previous section and are expressed in terms of potential output. Hence, the expected sign for b_2 is positive, that for b_3 , b_5 , and b_6 is negative, while that for b_4 is uncertain. As for the output gap variable \bar{y}_{it} , a requirement is that it should be uncorrelated with the contemporaneous primary budget deficit. For that purpose, \bar{y}_{it} is instrumented using the past value of the output gap and the contemporaneous value of the US output gap.

The impact of the EU fiscal framework is measured by a dummy variable taking value 1 if data refer to EMU countries after 1993 and zero otherwise. Consistently with the model presented in the previous section, after the start of phase II of EMU we should expect a different value for the constant term a_0 and for the coefficients of output gap, debt and the lagged primary CAB. We therefore add to regression (A) the value of such variables interacted with such the ‘EMU dummy’. The coefficient for each variable for EMU countries after 1993 is given by the sum of the original coefficient plus the coefficient of the interacted term. The full model is therefore estimated in the following way

$$I_{it} = a_0 + a_1 D^{EMU} + a_i + b_1 pcY_{it-1}^* + b_2 \tilde{r}_{it} + b_3 e_{it-1}^c + b_4 \bar{y}_{it} + b_5 (1 + r_{t-1}) B_{it-1} + b_6 \tilde{s}_{it-1} + b_7 D^{EMU} \bar{y}_{it} + b_8 D^{EMU} (1 + r_{t-1}) B_{it-1} + b_9 D^{EMU} \tilde{s}_{it-1} + \varepsilon_{it} \quad (B)$$

where D^{EMU} is the dummy variable capturing the effect of phase II of EMU. Concerning the expected sign for the interacted variables, while for a_1 , b_7 and b_9 the expected sign is positive, it is negative for b_8 .

Table 2 reports regression results. Equation (1) estimates model (A) without instrumenting the output gap variable. All coefficients have the expected sign and magnitude and are significant. The coefficient for per-capita real GDP is particularly highly significant, meaning, according to our interpretation, that the efficiency motive characterizes significantly the patterns of public investment in EU countries. The output gap coefficient is positive but very close to zero, pointing to an essentially a-cyclical behaviour of public investment. Overall, as reported by the values of the within and the between R square, the equation helps to explain a quite significant fraction of the variance of public investment both across time and across countries. When the output gap variable is instrumented with its own lag and the US output gap (equation (2)). results hold almost unchanged in spite of an expected fall in the significance level of the output gap variable. Equation (3) reports the (instrumental variable) results for the sample restricted to EMU countries after 1993. As the sample shrinks, the level of significance of estimates drops. The only significant coefficients are those of per-capita trend GDP, that of the output gap and that of debt. In particular, the coefficient of the per-capita GDP seems particularly robust with respect to the sample definition. This is consistent with the view that the advent of the EU fiscal framework had mainly an effect on the priorities of

fiscal authorities concerning the determination of the budget, while the criteria for public investment determination were not *directly* significantly affected. In terms of our formal model presented in the previous section, this evidence is consistent with the view that the introduction of the EU fiscal framework has mainly altered the weights (α , β and γ) in the loss function for the determination of the primary CAB. This presumption is further supported by the large difference between the value of the debt coefficient in specification (3) compared with specification (2). By limiting the sample to EMU countries after 1994 the size of the debt coefficient rises considerably in absolute value. Equation (4) estimates model (B), thus allowing for a change in the constant term, and in the coefficient of the output gap, the debt and the lagged primary CAB as a result of the advent of phase II of EMU.²⁰ Results confirm the expectations from our formal model. After phase II of EMU the constant term rises as the coefficient for the output gap and the lagged primary CAB, while that of debt falls. As a result of the introduction of the EU fiscal framework, government investment becomes slightly more pro-cyclical and almost twice sensitive to debt levels. Concerning the relation of investment with previous-year budget measures (primary CAB), the relation turns from weakly negative to slightly positive. Summarizing, after phase II of EMU the behaviour of government investment becomes more influenced by a debt stabilisation motive, less by an output-stabilisation motive, and negatively affected by past values of budget deficits.

The results obtained from the empirical analysis broadly support the view that the introduction of the EU fiscal framework may have had effects on public investment. These effects are mostly indirect, i.e., associated with a modified behaviour of fiscal authorities in the determination of the budget balance. Moreover, it is difficult to say whether public investment would have been higher or lower in the absence of the EU fiscal framework. Results are likely to crucially depend upon country-specific factors. On the one hand, after phase II of EMU countries with high deficit and debt levels had to carry out adjustments in their public finances that may have contributed to compress public investment expenditure. This negative effect of the EU fiscal framework is mainly reflected in the greater negative impact of debt on investment expenditure reported in our estimates. On the other hand, the improvement in the budget balances consequent to the introduction of the EU fiscal rules may have helped to create room for public investment

²⁰ An iterative least squares estimation method has been followed to estimate specification (4) due to the interaction of the instrumented variable (the output gap) with the dummy variable D^{EMU} . In a first step the output gap is regressed through fixed effect OLS on the lagged output gap, the US output gap and the remaining explanatory variables for public investment as described in equation (A). The prediction of this regression (y^1_{ct}) is then interacted with the D^{EMU} variable. In a subsequent stage, the output gap is regressed on the same explanatory variables as in the first step plus the prediction from the first step interacted with D^{EMU} , $\hat{y}_{ct} D^{EMU}$. A second prediction from this regression is obtained (y^2_{ct}), and its interaction with D^{EMU} constructed. The procedure goes on until step i which is defined such that $y^i_{ct} = y^{i-1}_{ct}$. In the last step public investment is regressed (through OLS fixed effects) against the variables described in equation (B), where the output gap variables used is y^i_{ct} . Convergence at the second decimal digit was obtained for $i=5$.

in several EU countries. The empirical analysis shows in fact that after phase II of EMU public investment is not anymore negatively related to previous period primary CABs.

6. The budgetary treatment of public investment and the EU fiscal framework

The EU fiscal architecture contained in the Maastricht Treaty and the Stability and Growth Pact requires that most public expenditure, including those in investment projects, will have to be funded from current revenues. In the EU legislation for fiscal discipline no special regime is in fact allowed to investment expenditure, even if the Maastricht Treaty (article 104.3) states that, when preparing its report on countries not fulfilling the deficit criterion, the Commission “...shall also take into account whether the government deficit exceeds government investment expenditure...”.²¹

In recent times it has been suggested by several scholars and policy makers to amend or reinterpret the EU legislation in such a way to exclude investment expenditures from the deficit ceilings relevant to the Excessive Deficits Procedure.²² The supporters of such kind of revision of the EMU fiscal framework claim that this would introduce flexibility in the management of European public finances and would help long-run growth.²³

In this section we review the main arguments raised in the literature concerning the benefits and costs of a golden rule for the budgetary treatment of public investment and we discuss the particular issues that would arise in a multilateral budgetary surveillance framework like that of the EU.

The golden rule consists of excluding investment spending from the computation of the budgetary indicator to be used to define targets and ceilings to the public budget balance. The idea beyond the golden rule is a relatively simple one. Like private companies, the government should not attribute entirely to a single year's accounts the full cost of a project that is likely to generate gains for long time period. Since investments normally imply future returns, their cost should consistently be distributed across several years, as returns materialize. A proper working of golden rule provisions requires adopting a dual public budget: one budget should only include current operations, a separate budget should be devoted to capital operations.²⁴ Gross investments would enter only in the asset side of the capital budget, while in the liabilities side of the capital budget would be registered the amortization of the public capital stock and (if negative) the balance of the current budget. As for the current budget, there only the amortization of the capital stock would be recorded, on the liabilities side.²⁵ Since the balance of the current account

²¹ Note that there is no explicit reference to net investment as opposed to gross investment.

²² For the debate on this point, see for instance Buiter and Grafe (2002) and Buti, Effijnger and Franco (2002).

²³ These concerns have been partly reflected in the Commission Communication on ‘Strengthening the co-ordination of budgetary policies’ adopted on November 2002. In this Communication the Commission proposes to introduce a more flexible application of the ‘close to balance or in surplus’ requirement for countries having made substantial progress towards the ‘close to balance or in surplus’ requirement and whose debt is below the 60 per cent of GDP to better achieve the goals of the Lisbon strategy.

²⁴ As it is currently done in the UK and, until 1980, in Sweden.

²⁵ So, by construction, the balance of the capital budget equals net investment minus the balance of the current budget.

equals the balance of standard budgets after subtracting net public investment, for countries adopting a dual-budget system targets for the balance of the current budget are equivalent to standard budgetary targets amended by the golden rule. Apart from facilitating the adoption of the golden rule, disposing of a dual budget system has the advantage of adding information on the contribution of public investment to the net worth of the public sector (see, e.g., Fottinger (2000)).

The golden rule is not a new idea, since it has been debated already in the 1930s as a means to induce acceptance of using public debt to finance investment.²⁶ The golden rule debate has been revived recently, both as a consequence of decisions taken by some anglo-saxon governments (UK, Australia, New Zealand) to admit special regimes for investment, and as a possible amendment to the provisions for budgetary discipline included in the Maastricht Treaty and the SGP.

In the European context, the countries currently adopting a golden rule are Germany and the UK.²⁷

In the German legislation, Article 115 of the Constitution states that the annual budget deficit of the general government cannot be higher than gross fixed capital formation in the federal budget. Exceptions are permitted to avoid 'disturbances to the overall economic equilibrium'. A crucial feature of the German golden rule is that the target is defined in terms of gross public investment, not net investment as it should be in principle.

In the UK, since the institution of the Code for Fiscal Stability in 1997, the general government and the broader public sector is allowed to borrow only to fund investment, while current spending must be fully financed from current revenues. The compilation of separate current and capital budgets facilitates the distinction between gross and net investment in national accounts. Consistently, the UK golden rule applies to net investment. It is also to note that the UK golden rule is applied over the budget cycle, so that a transitory decline in revenues would not affect medium-term expenditure targets. Finally, it is to be remarked that the golden rule in the UK is complemented by a rule aimed at guaranteeing that leaving net investment out of deficits is not incompatible with sustainable public finances. This is the so-called 'sustainable investment rule' which requires the debt-GDP ratio to be maintained at below the prudential 40 per cent ceiling.

In spite of the fact that a number of countries has experienced alternative forms of the golden rule, very few systematic analysis of the effects of such rules on public investment exist. One notable exception is the analysis by Poterba (1995) who studies the impact on public capital expenditures of different budgetary rules across US states. Results show that the use of separate capital budgets are on average associated with capital expenditure higher by about one third.

6.1. The rationale for the 'Golden Rule'

²⁶ See, e.g., Musgrave (1939).

²⁷ A number of countries (e.g., Belgium, the Netherlands, Sweden) adopted this rule during the 50s and 60s and abandoned it subsequently.

There are several grounds on which adopting a golden rule may be desirable. First, in the presence of deficit limits, socially desirable public investment projects may not be undertaken. Financing investment via increases in current revenues or cuts in current expenditures may in fact clash with agents' consumption smoothing objectives and turn out to be politically costly. Hence, it may occur that profitable investments may be rejected under a balanced budget rule. When this is the case, amending the balanced budget constraint by a golden rule would allow investments to be carried out through deficit finance.

Figure 7 rationalizes this argument in a stylized two-period representation of the links between budget deficit and public investment.²⁸ On the horizontal axis are represented resources (aggregate income) available for investment or consumption in the first period, on the vertical axis those for the second period. Individuals are assumed to like smoothing their consumption (their indifference curves between consumption at period 1 and period 2 are convex). In the absence of investment, income in period 2 would equal $1+g$ times that in period 1 (where g represents an exogenous growth rate of the economy). In case (public) investment takes place, one unit of income saved in period 1 yields $1+r$ units of income in period 2. In such a framework, debt-financed deficits may serve two purposes. The first is direct consumption smoothing. Since income is assumed to be higher in period 2 than in period 1 individuals might be better off by borrowing from the future, in such a way to consume the same amount in each period (graphically, along the 45 degree line). Whether borrowing for consumption smoothing is profitable depends upon the relation between the interest rate ρ and the growth rate of the economy g . The second motive for borrowing is to finance investment. Again, whether borrowing is profitable depends upon the returns of investment r being higher than the cost of borrowing ρ . In Figure 7 it is assumed that both g and r are greater than ρ . Under such circumstances, transferring income from period 2 to period 1 through a debt-financed deficit would make individuals better off. Consider a deficit which increases the resources available in period 1 from y_1^A to y_1^B . The resources for period 2 would be correspondingly reduced from y_2^A to y_2^B (the allocation of income as a result of deficit would change from y^A to y^B). Some of the extra-resources available in period 1 can be invested, yielding a return equal to r in period 2. To achieve the best intertemporal allocation of consumption, investment will be such that consumption in period 1 equal consumption in period 2. Hence, an amount equal to $y_1^B - y_1^C$ of the extra-income available at period 1 will be devoted to investment, the rest would be consumed. The allocation of consumption will then be represented at point y^C .

It is to note that in the stylised example of figure 7 a rule imposing balancing the budget would imply lower welfare.²⁹ Income would be equal to consumption in each period, and consumption smoothing gains would remain unexploited. Moreover, investment would not take place, since this would distort further consumption against period 1 and in favour of period 2. Hence, investment gains would not materialize. The welfare loss associated

²⁸ The argument is a simplified exposition of ideas contained, for instance, in Barro (1979).

²⁹ Note also that in such a stylized two periods example no distinction is possible between nominal and cyclically-adjusted budget balances.

with having the balance budget is represented graphically by the shift individuals shifting from indifference curve U^C to indifference curve U^A . How would a golden rule that admits deficits for investment purposes operate in such a framework? Still consider a deficit equal to $y_1^B - y_1^A$. In this case the deficit can only finance investment. Consumption in period 1 will then remain unchanged to y_1^A , while that in period 2 will increase at y_2^{GR} . Individuals' welfare would be represented by indifference curve U^{GR} , which would lie between that under no deficit constraints (U^A) and that with a balanced-budget constraint (U^C).

Some caveats to the above analysis are in order. First, the conditions for the desirability of deficits (high growth rate g , high return on investment r and low interest rates ρ) are not necessarily satisfied in reality. Second, the analysis does not take into account political economy considerations that explain a possible bias of governments towards excessive deficits.

A subtler motive for underinvestment arising from deficit ceilings has been proposed by Peletier, Dur and Swank (1999). The analysis builds on that of Tabellini and Alesina (1990) who show that governments may have a tendency to run excessive deficits for strategic purposes. If current governments have a preference over a certain type of current expenditure but are uncertain about the preferences of future governments a bias towards too high deficits may emerge. In fact, by running budget deficits, policy makers would at the same time influence the composition of current public expenditure and limit the spending possibilities of successors. This strategic interaction between current and future policy-makers would at the end distort the intertemporal allocation of resources from the optimal path that would be chosen 'ex-ante' by the society. Peletier, Dur and Swank (1999) amend the model of Tabellini and Alesina (1990) including the problem of public investment, making the assumption that differences in policy-makers' preferences mainly fall on current, rather than investment expenditure. They show that in absence of deficit ceilings governments will use strategically current expenditure (leading to excessive deficits) but will choose investment that are socially optimal. When instead there are deficit ceilings that do not distinguish between current expenditure and investment, governments may be induced, for strategic reasons, to underinvest. The reason is that by reducing investment current policy makers can assure themselves a high level of current expenditure of the preferred type (they cannot increase deficits which are bound exogenously), reducing at the same time the amount of resources that will accrue to future governments from the returns on investment. Under such a framework a golden rule that excludes investment expenditure from the deficit ceiling would help to avoid the tendency towards strategic underinvestment.³⁰

There is a further rationale for the desirability of golden rule, that of inter-generational equity. As emphasized, for instance, in Balassone and Franco (2001), the adoption of deficit ceilings that do not distinguish between current and investment expenditure may

³⁰ Of course, central to the argument is the assumed asymmetry between current expenditure and investment. While policy-makers judge differently different types of current expenditure, they are assumed to evaluate investment the same way.

redistribute income away from current generations due to the formation of a ‘double burden’. Current generations in fact will continue to pay back for the debt accumulated to finance investment undertaken by the past generations (in the form of taxes levied on their incomes), but will also have to pay entirely for the new investment carried out by themselves, without the possibility of deferring their cost to future generations through debt. The double burden issue is a transitory one: over time, all generations will pay for current investment only, without inheriting debt used to finance past investment. However, the transition may penalize the generations alive during the shift in the financing regime. This redistributive effect may reinforce the bias towards excessively low investment levels when ceilings on budget deficits operate.

6.2. Limitations and drawbacks

In spite of the potential benefits of a golden rule there are also considerable drawbacks and implementation problems.

A first set of basic problems with the golden rule have to do with its desirability and effectiveness. As illustrated previously, there is not a clear theoretical or empirical *a-priori* on whether actual public investment is more likely to be above or below the optimum. If the process of public decision making prevailing in a given jurisdiction produces a bias towards excessive public investment, then avoiding the distinction between current and capital expenditures in fixing budgetary targets may be beneficial, while the operation of a golden rule may prove counterproductive.³¹ Concerning the effectiveness of the golden rule, what is to be assessed is the likelihood that the presence of budget ceilings that make no distinction between current and capital expenditures do actually constraint desirable public investments. As illustrated in the theoretical example depicted in figure 7, for this to happen, a set of conditions (on growth, returns on investment, cost of public borrowing) have to be satisfied in principle.

A further substantial drawback of the golden rule has to do with possible distortions in resource allocation. The idea of the golden rule is that of distributing over time the costs of public projects that are likely to generate income streams across several years. This is a principle that is normally followed in the private sector accounting. However, the analogy is very limited, since there are major differences between the concepts of economic returns for the public and the private sector. While for private firms economic returns of investment projects must translate into financial returns at least in the long run, this is not necessarily the case for the public sector (think, for instance, to investment projects with environmental purposes). Moreover, while private firms generally appropriate most of the returns from their projects, the returns of public sector initiatives are normally spread to the whole society. It follows that the economically meaningful definition of public investment is not an obvious one, and quite often does not coincide with the definition used in national accounts. On the one hand, a relevant share of public expenditure that generates substantial future returns is not included in statistical definitions of public investment. This is for example the case of wages for teachers, researchers or doctors, which are classified as current expenditure. On the other hand, some public expenditure

³¹ See, e.g., Fottinger (2001) for a formal development of this argument.

classified as investment may not provide substantial returns (e.g. investments in waste management facilities or public housing). Given the inevitable difficulties in finding economically meaningful boundaries for the concept of public investment, the adoption of a golden rule is likely to produce a re-composition of productive public expenditure with a-priori ambiguous effects on efficiency, growth and welfare. Finance constraints would be released on expenditures in physical assets (normally covered by the definitions of public investment from national account statistics), while expenditures increasing the stock of knowledge and human capital would remain constrained by deficit ceilings. Finally, implementation problems should be taken into account. These arise especially with the determination of net investment. A sound application of the golden rule requires considering investment net of amortization. The calculation of amortization, however, is subject to technical difficulties and data of public capital consumption are quite often of poor quality and available with delays.

6.3. Is a golden rule desirable for the EU fiscal framework?

Proposals have been made to reform the EU fiscal architecture in such a way to grant special treatment to investment expenditures. Such type of reform may help to avoid an excessive compression of desirable investment projects especially during periods in which fiscal consolidations are needed to respect the requirement of fiscal discipline of the EU fiscal framework. However, depending on the actual design of the golden rule, there may either be serious risks for the sustainability of public finances for some countries or implementation issues which may undermine the overall quality of EU budgetary surveillance.

The effects of possible reforms of the Maastricht Treaty and the SGP depend on the way the golden rule is designed and implemented in the EMU multilateral framework. In particular, reforms may concern revising the definition of the fiscal parameters to be targeted (nominal deficit, structural deficit) or the value of the budgetary measure to be subject to an upper limit (the Maastricht 3% ceiling). Any reform option aimed at amending the Treaty and the SGP with a golden rule should also clarify which kind of investment outlays (net or gross) to consider and the relevant time frame. Such a distinction is likely to have crucial implications for the management of public finances in the EU context and the quality of budgetary surveillance. An application of the golden rule in accordance with its economic rationale would require using the concept of net investment. However, EU countries normally do not dispose of a dual-budget accounting system, which would instead be required for an efficient application of the golden rule applied to net investment. The calculation of amortization is a complex process, which requires estimating the economic value of each public capital item and its expected life period. These difficulties would become particularly relevant in a multilateral framework. Amortization rates should be evaluated by all countries following common methodologies, and opportunistic accounting practices should be prevented. The risk is that poor quality of net investment data, delayed availability of such data, and heterogeneous accounting practices across countries may increase the uncertainty surrounding the 'true' value of budgetary measures to be used in EU budgetary surveillance. The above mentioned difficulties arising in EU budgetary surveillance must

be weighted against the relevance of the impact of the reform. In absence of better measures, an indirect indication of the order of magnitude of the impact of an EMU-wide golden rule applied to net investment can be inferred from past values of net investment in European countries. During the eighties and nineties, average annual net public investment rates in the EU-15 area were well below 2 per cent of GDP, with values around 1 per cent of GDP for countries like Belgium, the Netherlands the UK and Sweden, while the average rate was negative for Denmark. Even assuming that net public investment rates will increase in the future as a result of the application of the golden rule, values for net investment will be likely to remain quite small.

The alternative of applying an EMU-wide golden rule to gross investment would avoid implementation issues. Data collection and reporting would not be an issue: Member States already report gross investment data in their Stability and Convergence Programmes. However, serious problems of public finance sustainability may emerge for high debt countries especially if gross investments are actually taken out from computation of the budgetary measures used in the EU fiscal framework without revising the value of for the upper ceilings for deficits and that of medium term targets.³²

Overall, the risks and negative side effects of deducting investment expenditures from the computation of deficits to be used in the EU fiscal framework are likely to outweigh the possible benefits (European Commission, 2003).

7. Public-private partnerships, public investment and deficit accounting issues

7.1. Definition, taxonomy, and recent experiences

The involvement of private sector corporations to build and operate public projects has become an increasingly widespread practice in EU countries. Following the experience of the UK Private Finance Initiative, in a rising number of countries the construction and operations of infrastructures such as roads, bridges or airports are made jointly by the government and private sector enterprises that finance the projects through so-called Public-Private Partnership (PPPs).³³ The European Action for Growth launched at the October 2003 European Council is built around the idea that the mobilization of financial resources for the realization of growth-enhancing infrastructure projects in the EU requires a reinforced co-operation between the public sector and private operators.

There is not an unambiguous definition of what constitutes a PPP. Broadly speaking, PPPs concern the transfer to the private sector of investment projects that traditionally have been executed or financed by the public sector (see, e.g., Grout, 1997). Four

³² A fortiori, such a sustainability problem would arise if the expenditure categories to be deducted from the computation of deficits to be used in the EU fiscal framework are not limited to public investment but also include other relevant items for the pursuit of the 'Lisbon strategy' such as R&D or education.

³³ Currently, PPPs cover about 15 % of the finance provided yearly to publicly sponsored investment projects in the UK (Spackman, 2002). In other European countries like Germany, Spain, France, the Netherlands, Portugal and Austria and Finland, PPP projects have been recently carried out, mainly in the field of transport infrastructure. Almost all the other EU Member States have planned PPP projects.

elements, however, seem required to qualify PPPs. First, the project should concern the construction or the operation of physical assets in areas characterised by a strong public function (e.g., transport, urban development, security,...) and involve the public sector (general government) as the principal purchaser. Although PPPs are especially relevant in transport infrastructure, examples of Public-Private Partnerships can be found in the provision of defence, health, education and cultural services, the building and operation of prisons or the area of water and waste management. Second, the PPP must involve a corporation outside the general government (often a private corporation) as the principal operator, i.e., the agent that carries out the project. Third, the principal finance of the project should not come from public debt but from other sources, such as private bonds. Fourth, by way of the partnership the way the project is executed must change compared with the alternative of pure public supply. This means that in PPPs the private operator provides significant inputs in the design and conception of the project and bears a relevant amount of risk.

The main distinction between PPPs and alternative privatization schemes is that the public sector plays a key role as purchaser of services. While in the case of pure privatization (e.g., of public utilities) the clients of the private operator are private users, in the case of infrastructure building realized through PPPs the government normally pays for the services to be supplied or has an influence in their specification. What instead distinguishes PPPs from the traditional public procurement model is the origin of the funds to accomplish the project. Instead of relying on government borrowing, most PPPs are financed through bonds issued by the private operator.

For accounting and performance evaluation purposes it is useful to classify PPP schemes according to the type of financial operations involved as follows:³⁴

Sale of services. After having funded and executed the project, what the private operator sells to the purchasing government is the flow of services from a capital asset (e.g., a road, a bridge, a prison). In addition to the services emanating from the use of the assets, additional services can be provided by the private counterpart for the regular operation of the asset (e.g., maintenance). The contracts specify at which conditions the government can access these services. This is the most frequent case of PPP. In a sense, PPPs can in this case be assimilated to a form of *leasing* rather than a case of asset purchase. This scheme has been extensively used for PPPs concerning the finance, building and operation of infrastructures such as prisons, railways or roads.

Financial free standing. The private operator designs, builds, finances and operates the asset and recovers the costs through direct charges to users without direct payments from the government. The involvement of the public sector is in the provision of licenses, in securing conformity of the project with public purposes and in regulating the private operator. This scheme has been used especially in projects concerning transport infrastructures such as bridges and highways. Compared with a classical privatization schemes the government plays a greater role in contributing to the definition of the characteristics of the services to be provided by the asset.

³⁴ This taxonomy has been proposed by Pollitt (2000) to classify UK Private Finance Initiative projects. Note that the taxonomy is not fully exclusive, since PPP cases may have characteristics common to more than one of the cases identified.

- *Joint ventures.* In this case the finance to build the project does not come fully from the private operator but is partially provided by the government.

Also relevant for accounting and evaluation purposes are the characteristics of the private operator involved in the PPP and how the contract is designed. The private operator can be either an existing firm or a new firm created on purpose. Its activities can either be multiple and diversified or confined to those of the PPP contract. Moreover, the operator may be fully private or participated by the public sector. Regarding the design of the contract a crucial aspect is the specification of the modalities with which payments are made to the private operator by the government. Payments may be in fixed yearly amounts, proportional to some measure of the cost of the asset provided by the operator (e.g., in the case of road building, proportional to the length of the road) or proportional to the effective flow of services provided by the asset (e.g., still in the case of roads, proportional to the number of vehicles using the road). The way government payments are specified in the contract are crucial in determining how risks are shared between the government and the private operator. Also key in determining the sharing of risk between the public and the private counterparts is the possible presence of guarantees by which the government backs the bonds issued by the private operator to finance the project. Another characterising feature of PPP contracts are their long term nature (due to the fact that the revenues for the private operator must be distributed over sufficiently long time horizons to cover up-front costs) and the possible inclusion of clauses by which the governments commits to buy back the asset after a given number of years.

7.2. The economics of PPPs

Which is the rationale for using PPP schemes to finance and operate public purpose investment?

In the policy debate it is often emphasized that PPPs have the desirable property of putting capital spending outside government budgets, thus easing the effects of external budgetary constraints on public investment. Though very popular, this argument has little substance. First, it does not address why PPPs should be preferred to alternative schemes to finance capital formation with public purposes that do not imply an increase in government borrowing (e.g., classical privatisation). Second, even if the impact on current budget balances of PPP schemes is most likely to be smaller compared with the alternative of pure public procurement, the long-term impact of PPPs on public finances is to be assessed carefully. The main implication for public finances of choosing PPPs as opposed to traditional public investment is that of converting up-front fixed expenditures into a stream of future claims. In computing the actuarial value of the government commitments of PFI schemes one has to estimate not only the size and distribution of the regular payments specified in the contract, but also the cost of the possible buy-back of the asset and the possibility that debt guarantees are exercised. Comparing the impact of PPPs schemes on the actuarial value of public finances with that which would arise from traditional public investment is thus a complex issue which requires a great deal of

information. The argument that PPPs schemes are preferable to publicly funded investment expenditures from the viewpoint of long-term public finance sustainability is thus not well grounded. The distinguishing feature of PPPs is rather that of permitting to smooth out the cost of public investment. This in turn may be effective in releasing finance constraints on public investment in presence of formal ceilings on budget deficits.³⁵

The rationale for the use of PPP schemes is rather that of microeconomic efficiency. Even assuming that competitive tenders for the selection of private counterparts are feasible and efficient, pure privatization schemes may not be optimal when there are reasons that justify a form of control on the design of the project by the public sector. This is the case when the project concerns the delivery of pure public goods (e.g., a prison), when externalities are particularly relevant (e.g., when projects have a considerable environmental impact) or when the distributive consequences of the project are a major concern (e.g., the provision of health facilities). In those cases regulation mechanisms may not be sufficient to ensure that public objectives are satisfactorily met. The standard alternatives are direct public provision or public procurement through competitive tenders. In many instances, public procurements (contracting out) guarantees higher cost efficiency than direct public provisions.³⁶ In both alternatives, however, it is the public sector that provides the financial funds to carry out the project and that exercise the control on the design of the asset. PPP schemes offer a third alternative. In such a case, the finance of the project is provided by the private sector, as in privatization schemes, but the public sector plays a relevant role as client of the services provided by the asset. In particular, PPP contracts may specify that the private operator will be remunerated only if the actual supply of services is judged to be successful. The fact that the object of PPP contracts is the supply of services rather than the provision of the asset can make a major difference with respect to public procurement schemes. Specifying and monitoring the desired characteristics of services is normally easier than specifying and monitoring those of assets. Thus, contracts that have as their object the flow of services rather than the build of assets help to reduce the incentives that the private supplier may have to cut on quality, while preserving the incentives to contain costs (Grout, 1997).³⁷ The microeconomic rationale of PPP schemes is thus that of shaping incentives in such a way to achieve cost efficiency without compromising public objectives relating to the quality and characteristics of the services provided by the asset.

³⁵ The conditions under which external constraints on budget deficits can effectively reduce public investment have been discussed in section 3.2.1.

³⁶ The reasons are well-known (see, e.g., Domberger and Jensen (1997) for a survey). In particular, bureaucracy theories suggest that government officials tend to focus on objectives different than that of cost minimization (e.g. maximising the size of their budget).

³⁷ Hart Shleifer and Vishny (1997) develop an incomplete-contracts model of public procurement and show that, compared with direct public provisions, private operators will in general have higher incentives to keep costs low but lower incentives to keep quality high. They provide supporting evidence in the context of prisons in the US.

7.3. Public-Private Partnerships and EU budgetary practices

Although there are microeconomic reasons that may justify the use of PPP schemes to finance and carry out project for the provision of public purpose infrastructures, there is the risk that PPPs are increasingly used by EU governments to evade SGP constraints on public deficits. As already pointed out, the impact of PPPs on long-run public finance sustainability as an alternative to traditional public investment depends upon a complex set of factors and should be assessed case by case. In general, when resorting to PPP schemes, governments should conform to the Eurostat guidelines on accounting practices and to a series of transparency principles.

Concerning the treatment of PPP schemes in national accounting, Eurostat fixes a set of guidelines National Statistical Institutes should respect. A crucial issue is that of evaluating the effective sharing of risk and rewards between the general government and the project operator associated with the built and operation of the asset. According to the Eurostat guidelines, whenever there are regular payments made by the government to the operator, the asset should be recorded in the balance sheets of the contracting party that effectively bears most part of the risks and rewards form the project. Evaluating the sharing of risks in PPP schemes has thus major implications for the computation of public deficits and debts. If it is the operator that bears most of the risks (as it should be in the case of PPP with sound microeconomic grounds, as illustrated in the previous section) then public deficits will be affected only by the regular payments made by the government. If instead most of the risk lies with the government, then the PPS asset will be recorded in the government balance sheets and public debts and deficits will be affected by the full cost of the project.³⁸ Given the uncertainties surrounding the appropriate evaluation of risk-sharing in PPP schemes, a recent Eurostat decision has defined a set of common criteria to be followed by National Statistical Offices to assess the sharing of risk between the government and the PPP operator which will complement the existing guidelines for PPP recording. The decision states that “the assets involved in a public-private partnership should be classified as non-government assets, and therefore recorded off balance sheets for government, if both the following conditions are met: i)

³⁸ Eurostat criteria distinguish two major cases, depending on whether regular payments are made by the government to the operator or whether the PPP operates with 'financial free-standing'. If the government makes regular payments to the operator in exchange of services which constitute government final consumption expenditure, the PPP contract is assimilated to a leasing contract and the classification of assets and transactions depends upon which counterpart is exposed to most of the risks and rewards of ownership. If it is the operator to bear most of the risk, then the asset will enter the balance sheets of the operator, and only the regular payments by the government will impact government net lending/borrowing. This corresponds to the case of an operating lease contract. In the case in which it is instead the government to bear most of the risks and rewards of ownership, then the asset must enter government balance sheets, with the PPP giving origin to gross fixed capital formation for the general government and increased budget deficit. (balanced by an imputed loan of equal value which impact public debt). When instead the corporation builds and/or operates the asset financing its costs by charging users different than the government the asset is recorded in the balance sheet of the corporation and no transaction affects government net lending.

the private partner bears the construction risk; ii) the private partner bears at least one of either availability or demand risk”.³⁹ By construction risk it is meant the risk associated with events like late delivery, additional costs, or technical deficiency of the asset underlying the PPP contract. The availability risk refers instead to events that may alter the contracted volume and quality of services to final users. Finally, by demand risk it is meant the risk associated with factors (different from actions taken from the government or the private partner) that induce variability in the demand of the services object of the PPP contract.

It is also relevant that National Statistical Institutes conform to transparency principles concerning the recording of operations giving origin to so-called contingent liabilities. Contingent liabilities normally arise when in PPP contracts governments offer a guarantee to the debt issued by the private operator to finance the project. Public guarantees do not constitute effective government liabilities because there is no certainty that they will translate into increased debt in the future. However, this may be the case if certain contingencies occur, i.e., in the case of default of the private counterpart. Since with public guarantees there is no certainty concerning the impact on public debt they are recognized only under cash accounting, if and when the contingent event (the PPP counterpart default) actually occurs and payment is made. However, given the possible relevant debt impact of contingent liabilities, the inclusion of information (also quantitative when possible) on each provision giving raise to contingent liabilities in supplementary budgetary documents is recommended in international codes of fiscal transparency (e.g., IMF Code of Good Practices on Fiscal Transparency).

8. Concluding remarks

This paper has analysed empirically the link between the relation between the introduction of the EU fiscal framework and public investment. Results from panel data analysis suggest that the impact of the EU rules for fiscal discipline is not a clear-cut one. On the one hand, after phase II of EMU, public investment is found to be more negatively affected by debt levels. This is consistent with the view that in the run-up to Maastricht the budgetary adjustment implied a significant decline in public investment, especially in high-debt countries. On the other hand, results indicate that after phase II of EMU public investment became positively related to previous period budget balances, so that the improvement in the budget balances consequent to the introduction of the EU fiscal rules may have helped to create room for public investment in several EU countries.

From the above results follows that the widespread concern that the EU rules-based fiscal framework is responsible for sub-optimal levels of public investment in EU countries should not be generalized or over-stated.

³⁹ ‘Treatment of public-private partnerships’, Eurostat News release 11 February 2002, <http://europa.eu.int/comm/eurostat>.

Concerning the proposals to amend the EU fiscal framework in such a way to deduct government investment from the relevant fiscal aggregates (introducing some form of golden rule), the possible benefits in terms of improved inter-temporal allocation of resources are most probably outweighed by the negative consequences these may have, especially in a multilateral setting like that of the EU. Depending on whether it is net or gross investment to be deducted from budget balances, either the quality of EU budgetary surveillance or the pursuit of the objective of fiscal sustainability could be compromised.

As for the growing practice of financing public purpose investment projects through public-private partnerships (PPPs), it is important that all the relevant information to make possible a proper evaluation of these practices on long term public finances is made available. In particular, transparency is needed concerning the conditions underlying PPP contracts (e.g., the presence of government guarantees on the debt issued by PPP partners) and the accounting criteria followed by statistical authorities to record PPP projects.

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Table 1: The composition of fiscal consolidation (1970-2002), EU-14

	Number of observations	Total revenues, general government	Total expenditure, general government	Gross fixed capital formation, general government
Overall period	448	0.9	1.07	-0.98
Consolidation periods	285	0.94	0.52	-1.28
Consolidation periods after 1985	196	0.37	-0.44	-1.36

Notes:

Data for Luxemburg are not included.

Figures refer to average annual changes in the ratio on GDP at current market prices. Cross-country averages are unweighted. The years of fiscal consolidation in each EU countries are those reported in European Commission (2000), "Public Finances in EMU - 2000", European Economy - Reports and Studies, 3, page 20 for the nineties, while for the remaining period are those reported in IMF (1996), World Economic Outlook, IMF, Washington D.C., page 57.

Table 2. The determinants of public investment across EU countries.

	(1)	(2)	(3)	(4)
	Fixed effect panel	Fixed effect panel IV	Fixed effect panel IV	Fixed effect panel IV
D^{EMU}				1.55 (0.25)***
pcY_{it-1}^*	-0.158 (0.015)***	-0.152 (0.016)***	-0.153 (0.059)**	-0.24 (0.018)***
$\tilde{\tau}_{it}$	0.191 (0.018)***	0.198 (0.019)***	0.042 (0.035)	0.179 (0.018)***
e_{it-1}^c	-0.135 (0.02)**	-0.145 (0.02)**	0.027 (0.034)	-0.11 (0.021)***
\bar{y}_{it}	0.056 (0.014)***	0.035 (0.021)	0.067 (0.0035)*	0.03 (0.021)
$(1 + r_{t-1})B_{it-1}$	-0.009 (0.002)***	-0.009 (0.002)***	-0.034 (0.007)***	-0.008 (0.002)***
\tilde{s}_{it-1}	-0.134 (0.02)***	-0.146 (0.021)***	-0.06 (0.039)	-0.133 (0.02)***
$D^{EMU} \bar{y}_{it}$				0.075 (0.0039)*
$D^{EMU} (1 + r_{t-1})B_{it-1}$				-0.015 (0.003)***
$D^{EMU} \tilde{s}_{it-1}$				0.112 (0.037)***
N. obs.	432	432	99	432
R sq. (within)	0.55	0.54	0.46	0.6
R sq. (between)	0.30	0.29	0.68	0.18
F test	84.55	80.2	11.08	61.61

Notes: Estimations method: fixed effects panel regression. The output gap is instrumented with lagged output gap and US output gap in equations (2) (3) and (4). Equation (3) reports IV estimated for the sample restricted to EMU countries after 1993. In equation (4) an iterative estimation procedure has been followed due to the interaction of the instrumented variable (the output gap) with the dummy D^{EMU} . White-robust standard errors are reported in parentheses. *, **, and *** denote, respectively, significance at the 10, 5 and 1 per cent level. Coefficients for country fixed effects are not reported.

Legenda:

D^{EMU} : dummy variable taking value 1 for EMU countries after 1993

pcY_{it-1}^* : per-capita trend real GDP

$\tilde{\tau}_{it}$: adjusted tax revenues over trend real GDP

e_{it-1}^c : lagged current expenditure over trend real GDP

\bar{y}_{it} : output gap over trend real GDP

$(1 + r_{t-1})B_{it-1}$: lagged debt gross of interest expenditure over trend real GDP

\tilde{s}_{it-1} : lagged value of primary CAB over trend real GDP

Figure 1. Gross fixed capital formation, general government (% of GDP at current market prices).

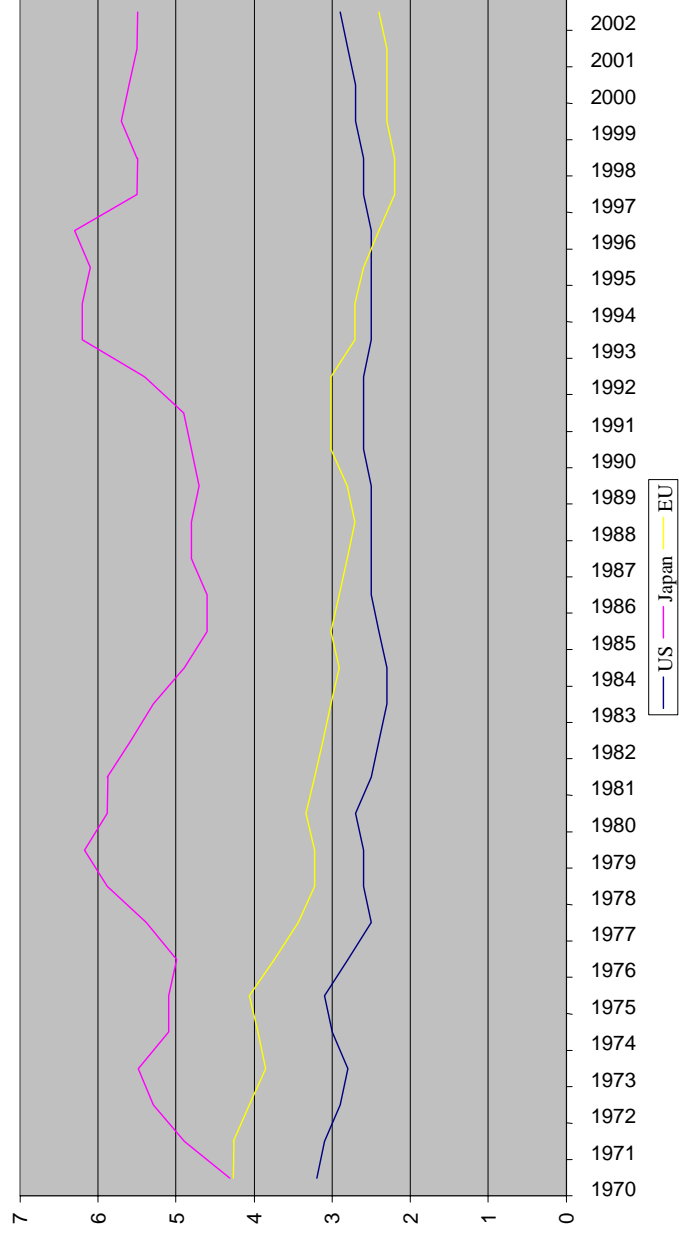


Figure 2. Gross public, private and total investment (ratios en GDP, average values for the period 1970-2002).

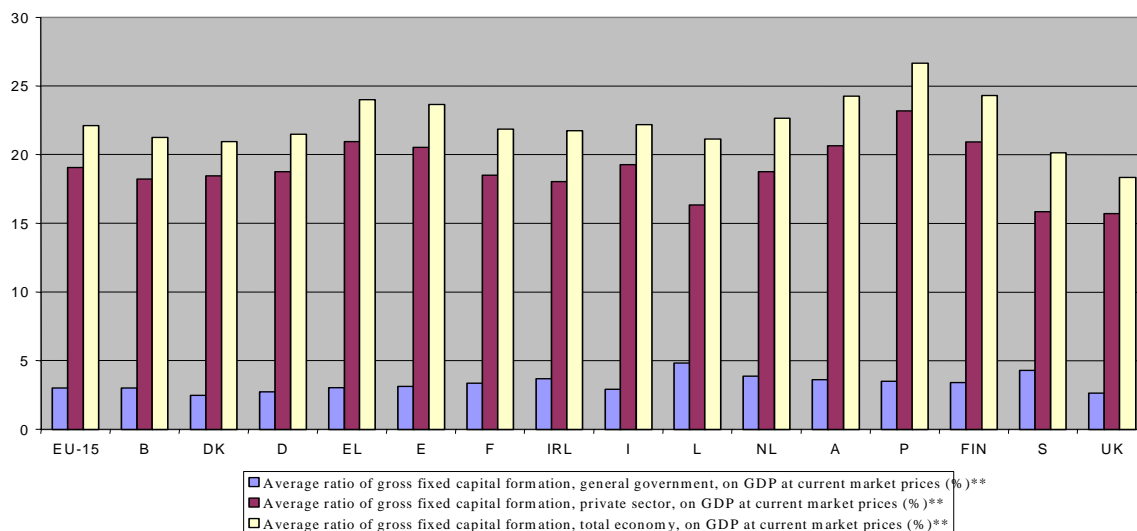


Figure 3.- Net public, private and total investment (ratios on GDP, average values over the period 1974-2001).

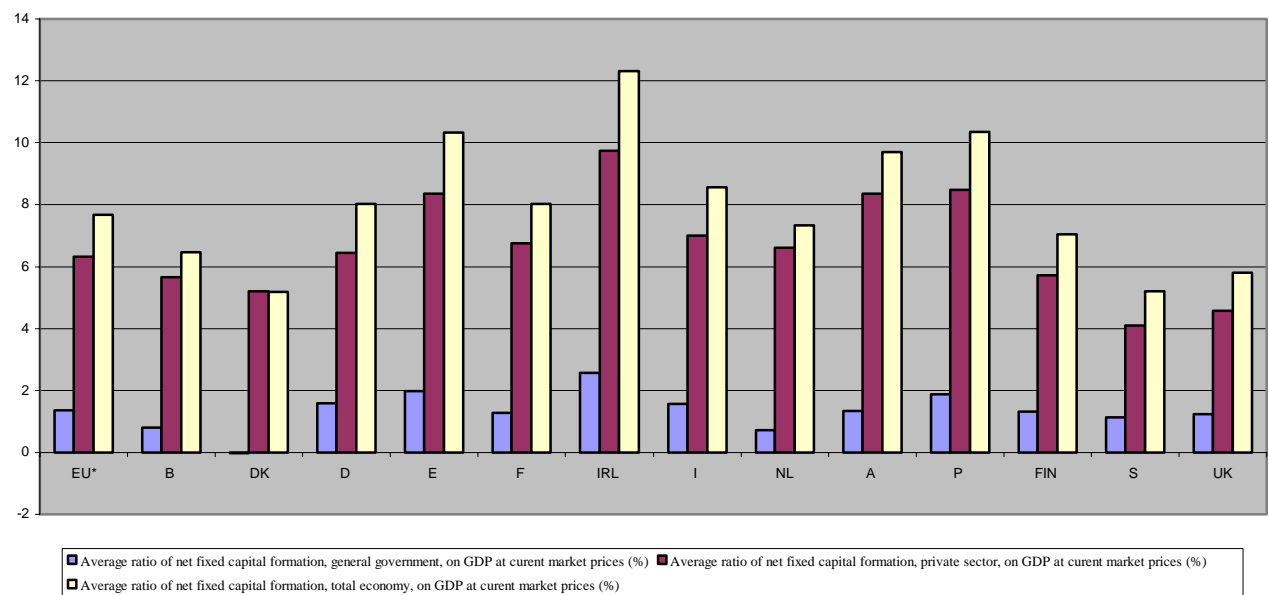


Figure 4. Average annual changes in investment ratios (1970-2002).

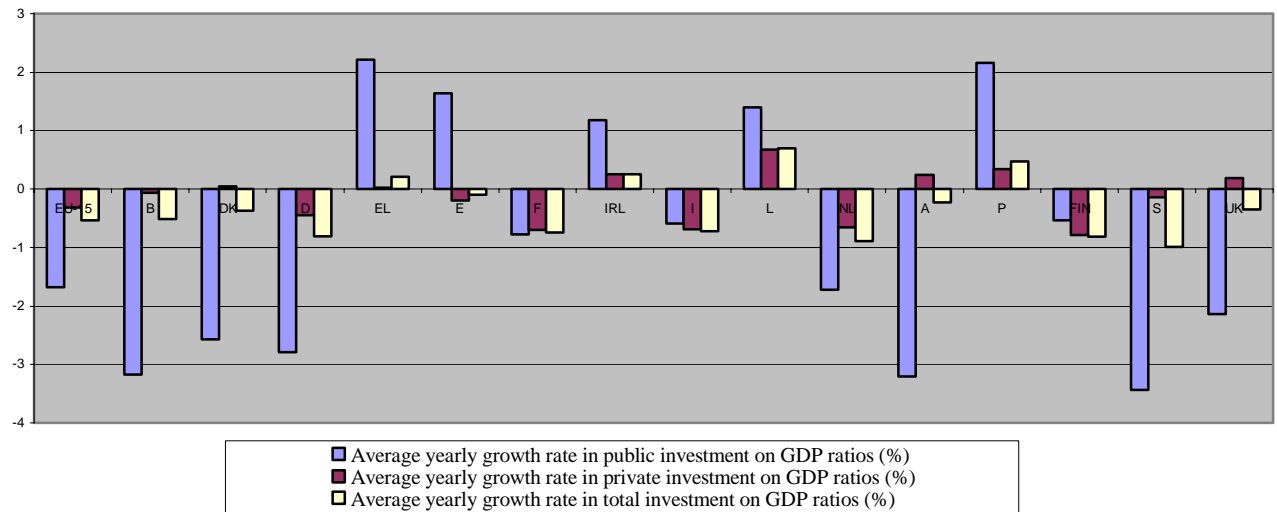


Figure 5. Growth rates in public investment (average yearly growth rates over the period 1970-2002) and income per-capita (average 1970-2002).

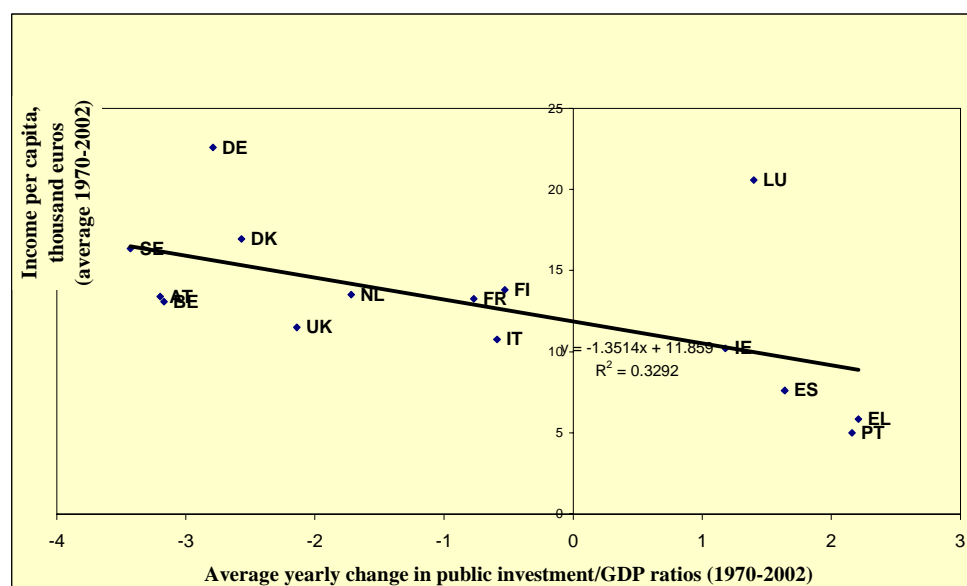


Figure 6. Public investment changes in the 1990s (average yearly growth rate in gross fixed capital formation, general government, % of GDP at current market prices).

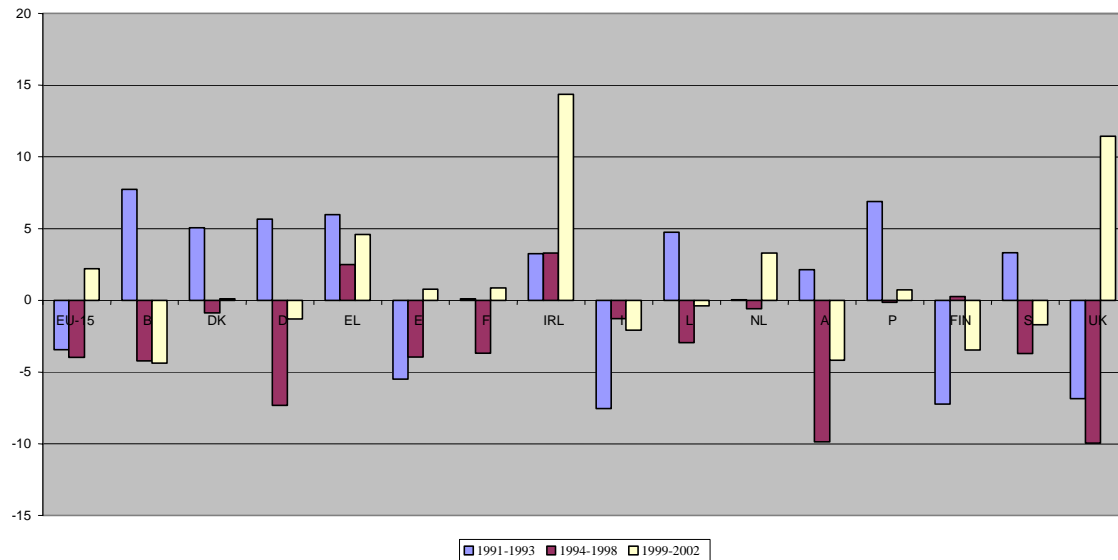


Figure 7: The golden rule and the intertemporal allocation on income, consumption and investment.

